City of Lodi

Lower Mokelumne River Watershed Sanitary Survey

Prepared for the City of Lodi's Surface Water Treatment Facility

September 2015

Appendix A

HDR Field Survey Information

A-1

Map of Field Study

Untitled Map

Write a description for your map.

Legend

Jahant Rd

E Jahant Rd

Peltier Rd

E Peltier Rd

Dustin Rd

Acampo Rd

Elliot Rd

Lockeford Plant Materials Center

N 99 Frontage Rd

WID CANAL

Boat Launch

Landfill

Lodi SWTF

CA-99 Homeless Camp

Weibel Vineyards

Lodi Lake Boathouse

Locke Rd

Brandt Rd

N Stockton St

W Elm St

Hwy 12

12

Beckman Rd

W Lodi Ave

S Cherokee Ln

99

W Kettleman Ln

J3

Church St

S Ham Ln

S Hutchins St

S Stockton St

E Kettleman Ln

Alpine Rd

N Hwy 88

88

Jack Tone Rd

N Tully Rd

N

2 mi

Google earth

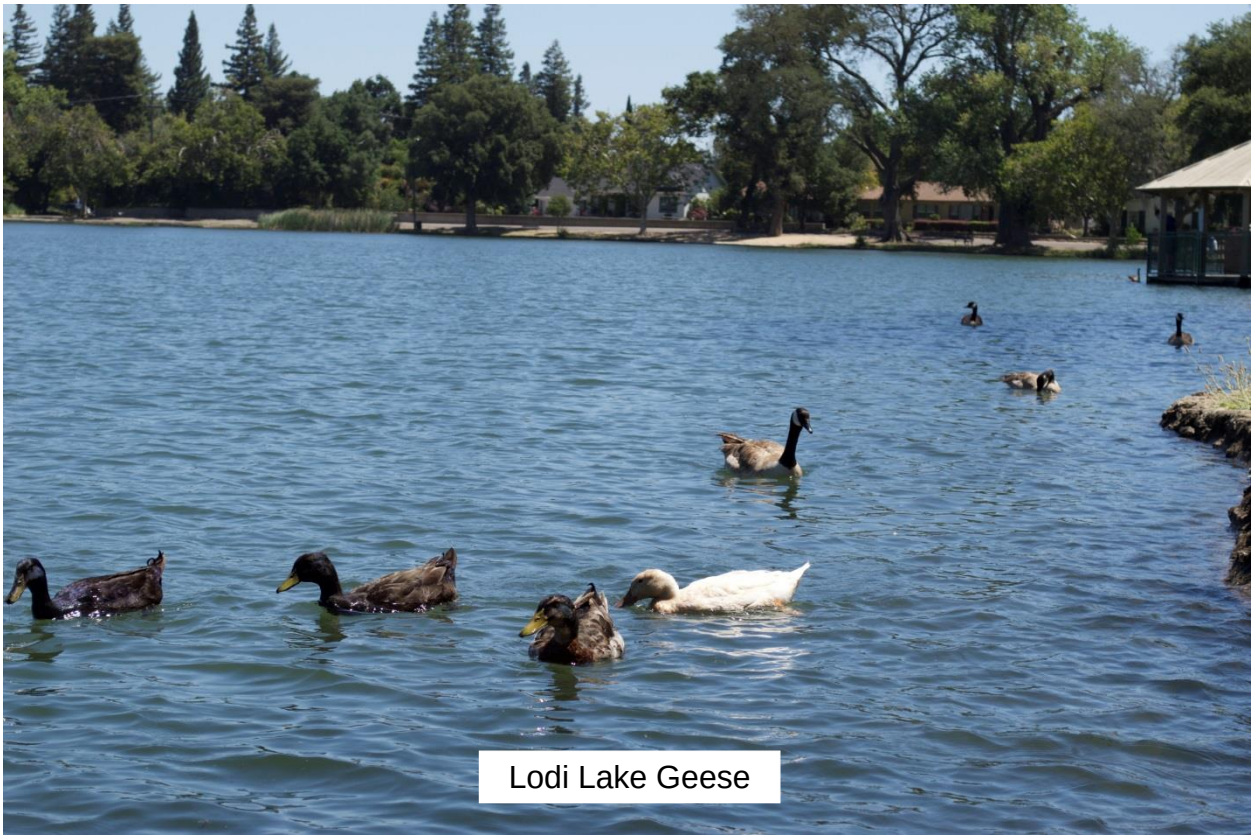
A-2

Additional Photos from Field Study

WID Intake

Lodi Lake Beach

Lodi Lake Geese



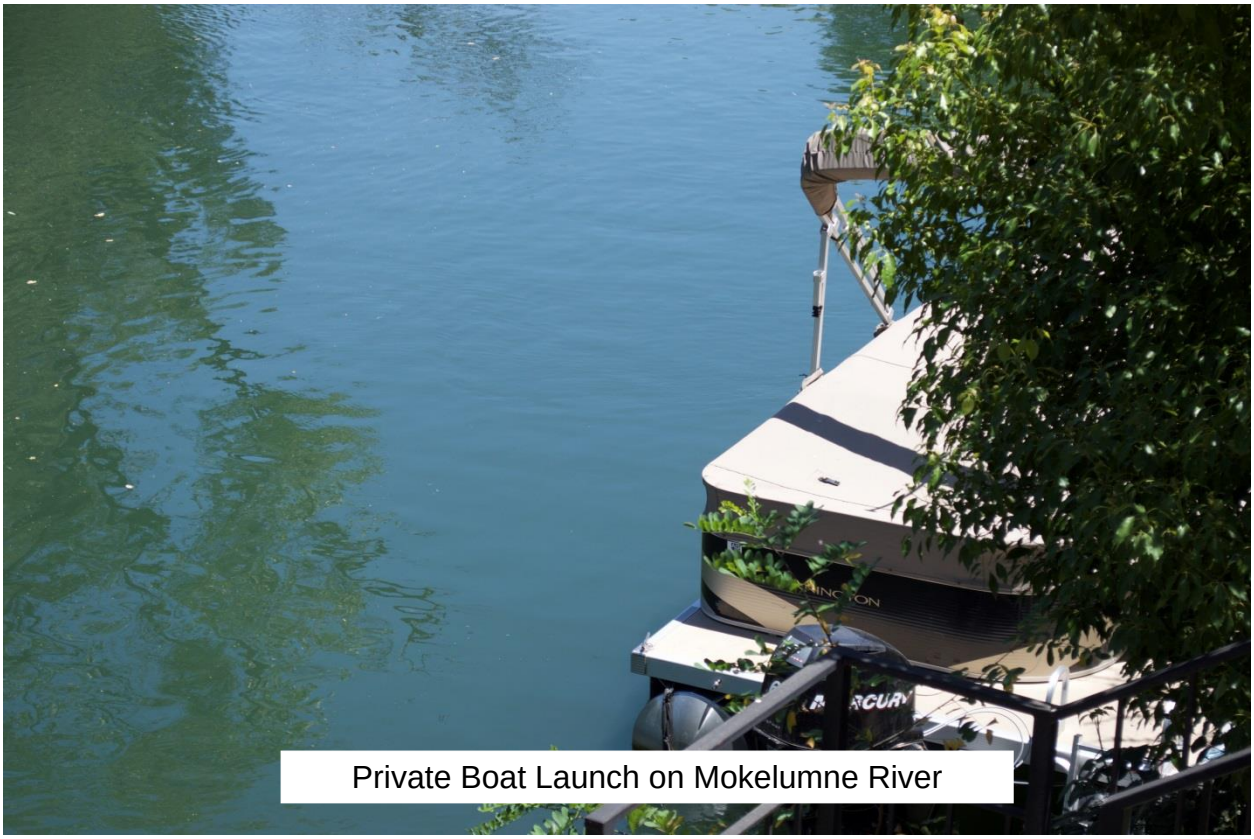
Lodi Lake Geese

Lodi Lake Information Board

Lodi Lake RV Dump Station (Closed)

Mokelumne River Adjacent to Lodi Lake Park

Mokelumne River Adjacent to Lodi Lake Park
(Cattle Grazing Area)



Private Boat Launch on Mokelumne River

Garbage Pile at Homeless Encampment at Hwy 99 River Crossing

Homeless Encampment at Hwy 99 River Crossing

Homeless Encampment at Hwy 99 River Crossing

Appendix B

NPDES Discharge Permits

B-1

EBMUD Camanche Dam Power House

Permit No. CA0082040 (Waste Discharge Requirements Order No. R5-2003-0153). The current permit contains effluent limitations for copper and other analytes.

9. Under the NPDES permit, the Discharger treated the wastewater to remove petroleum products (used for lubrication in the turbines) and discharged the treated effluent to the Mokelumne River downstream of Camanche Dam.

10. The Mokelumne River is listed as impaired for copper under the Clean Water Act (CWA), Section 303(d). As a result:

    a. The Discharger will be required to meet a stringent hardness-based Maximum Daily Effluent Limit (MDEL) and an Average Monthly Effluent Limit (AMEL) for copper beginning 1 October 2008. Because hardness values in the Mokelumne River are low, calculated values for MDEL and AMEL are also low.

    b. The Discharger has attempted to isolate and reduce the copper sources within the Power House's process wastewater stream but has determined that it is technically infeasible to reduce copper concentrations to levels that will consistently comply with the MDEL and AMEL.

    c. The Discharger has reported copper concentrations 50-feet upstream of the Power House effluent point of discharge that exceed the MDEL and AMEL values.

    d. The Discharger evaluated several alternatives for complying with the copper effluent limitations in a 27 June 2005 *Compliance Alternatives Study Report*. They included source control, additional wastewater treatment, application of intake water credits, pollutant trading, modification of effluent limitations, permit bubbling (facility wide discharge limit rather than separate limits at individual points of discharge), reuse, and land application. Land application and effluent limitation modification were selected as the only feasible alternatives. Land application was selected based on cost effectiveness and the ability to dispose of copper on to the land while protecting beneficial uses.

FACILITY CHANGES

11. Hydraulic source control activities at the facility have resulted in significant reduction in the wastewater flow rate from approximately 90,000 gallons per day (gpd) to approximately 15,000 gpd. The flow reduction has allowed land application of the wastewater as a feasible alternative.

12. Copper source control activities have resulted in wastewater quality improvement, but not to the concentrations that would be required to allow continued discharge into the Mokelumne River. Copper sources include erosion and electrochemical corrosion of piping and cooling equipment.

13. The Discharger is proposing to redirect discharge from the existing oil separation pond to a new Evaporation/Percolation (EP Pond) that will be located approximately 170 feet

north of the river. The EP Pond will provide approximately 750,000 gallons of storage with two feet of freeboard. The proposed pond location is shown on Attachment B, which is attached hereto and is made part of this Order by reference.

WASTEWATER SYSTEM

14. Water for the turbines is delivered via a 120-inch diameter epoxy-lined penstock. Water used to turn the turbines is returned to the Mokelumne River.

15. Wastewater is generated from several sources in the Power House. A schematic of the wastewater system is presented on Attachment C, which is attached hereto and is made part of this Order by reference. They include the following processes:

    a. Generator thrust bearing cooling.
    b. Generator air cooling.
    c. Generator lower guide bearing cooling.
    d. Turbine guide bearing cooling.
    e. Turbine shaft seal.
    f. Turbine head cover drain pump.
    g. Heat exchanger operation.

16. The wastewater generated as described in Finding 15 a through d travels through cooling jackets and does not come in contact with lubricating oil or bearings, and is discharged to the Mokelumne River untreated.

17. The wastewater generated as described in Finding 15 e through g is degraded as a result of use and is collected and treated as described below:

    a. Wastewater is collected in a sump equipped with a belt skimmer that removes oil. Oil that is skimmed from the sump is reused at the Power House. Skimmed oil is stored in a 250-gallon aboveground tank in the Power House.

    b. Wastewater is pumped from the sump to a concrete lined 20,000-gallon oil separation pond that is located outside the Power House. A rope skimmer and surface baffles remove any remaining oil from the wastewater. Skimmed waste oil is collected in a 300-gallon aboveground storage tank. The recovered oil is removed from the site as waste oil every 90 days.

    c. Treated wastewater from the 20,000-gallon oil separation pond historically discharged to the Mokelumne River. (This Order will change the discharge location to the EP Pond).

    d. A standby-unlined pond with a capacity of 85,000 gallons is located adjacent to the oil separation pond and is used when the oil separation pond undergoes scheduled maintenance. Typically, the oil separation pond is cleaned quarterly to remove

debris that falls into the pond. This procedure may result in oil being discharged to the standby-unlined pond because one of the two skimmers is removed from service.

18. A number of improvements have been implemented since 1998 to reduce the wastewater flow rate. The improvements are listed below:

    a. Replacement of the following
        i. Turbine Seals
        ii. Static seal retaining ring

    b. Evaluation and inspection of seal assemblies

    c. Corrections for dynamic seal maintenance and operation

    d. Evaluation of replacement of seals with packing boxes and glands

    e. Improved accuracy of flow measurements

19. The wastewater flow rate has been reduced from over 90,000 gpd to an average of less than 15,000 gpd through source control and equipment improvements at the Power House. Since January 2004 the flow rate has averaged 12,000 gpd. The Discharger used 15,000 gpd in the water balance, estimating a total annual flow of approximately 5.47 million gallons.

20. A number of improvements have been implemented since 1998 to reduce the copper and/or oil concentration in wastewater. The improvements are listed below:

    a. Replacement of the following:
        i. Bronze and copper equipment
        ii. Sump rotometers (bronze casting)
        iii. Kenney and basket strainers
        iv. Heat exchangers on air compressors

    b. Verification that sump pump impellers and castings are not made of copper

    c. Evaluation and implementation of alternative methods for replacing or coating turbine dynamic and static seals, including coating with paint or epoxy, hot metal spray coatings, seal metal replacement, and seal assembly replacement.

    d. Improved housekeeping - modification of work practices to prevent copper from entering waste stream.

    e. Preventive Maintenance

i. Quarterly maintenance of oil separation pond

ii. Routine cleaning of Power House sump

iii. Routine inspection of sump and pond skimmer system

21. As a result of the source control activities, the Power House's effluent total copper concentration was significantly reduced with the following range of concentrations:

Dates	Units	Concentrations	Median Value
Jan 1994 to Dec 2003	ug/L	121 to 1.8	8.5
Jan 2004 to Dec 2006	ug/L	18 to ND (0.73)	6.6

22. Wastewater copper concentrations were reduced from years 1998 to 2006; with the reduced wastewater flow rate, effluent loading rates were reduced from 2.1 pounds/year to 0.24 pounds/year.

23. The Discharger has collected samples upstream and downstream of the Power House. Samples collected upstream are labeled "R1," samples collected downstream are labeled "R2." Samples collected upstream characterize Camanche Lake water; samples downstream characterize Mokelumne River water with the Power House wastewater discharge returned to the river. Annual averages are presented below but the 2007 data does not include data collected in December 2007. The data indicates the Power House does not substantially change the water quality through the process of power generation.

Year	Total Copper (ug/L)		Hardness (mg/L)		pH (std. Unit)		Elec. Cond. (umhos/cm)	
	R1	R2	R1	R2	R1	R2	R1	R2
2004	3.00	2.97	19.1	18.6	6.8	6.9	NA	NA
2005	1.11	3.67	16.2	16.5	6.7	6.8	NA	NA
2006	1.33	1.24	15.0	15.5	7.0	6.9	41.0	53.2
2007	3.37	0.97	14.8	15.1	6.8	6.8	41.3	43.0

24. A summary of wastewater quality effluent from the oil separation pond is presented in the table below. The data is shown as averages for the years 2004 and 2005 and monthly averages for year 2006.

Date		pH (std)	O&G (mg/L)	Total Cu (ug/L)	Dissolved Cu (ug/L)	EC (umhos/cm)	DO (mg/L)
Average	2004	7.3	ND (1.0)	8.57	5.32	49.26	9.11
Average	2005	7.4	ND (1.0)	7.59	5.35	46.31	9.19
Jan	2006	7.1	ND (2.3)	4.15	2.9	41	8.3
Feb	2006	7.5	ND (2.2)	5.15	3.2	42.2	10.2
Mar	2006	7.8	ND (2.6)	4.75	3.7	43.2	10.9

Date		pH (std)	O&G (mg/L)	Total Cu (ug/L)	Dissolved Cu (ug/L)	EC (umhos/cm)	DO (mg/L)
Apr	2006	7.4	ND (2.6)	4.45	3.5	44.9	10
May	2006	7.5	ND (2.5)	11.25	4.1	50.4	8.4
June	2006	8.3	ND (2.5)	7.1	3.9	49.8	9.6
July	2006	7.2	ND (2.6)	5.9	4.3	38.9	8.5
Aug	2006	7.9	ND (2.5)	6.8	4.8	36.5	8.8
Sept	2006	7.2	ND (2.4)	11.5	7.8	35.9	8.2
Nov	2006	6.8	ND (2.5)	16.5	11.4	36.6	9.9
Dec	2006	7.6	ND (2.6)	5.1	3.8	39.7	11.5

O&G denotes Oil and Grease. Total Cu denotes Total Copper. Dissolved Cu denotes Dissolved Copper. EC denotes Electrical Conductivity. DO denotes Dissolved Oxygen.

25. The Power House and associated buildings are supplied with non-potable water. The Power House is equipped with an 80-gallon septic tank that pumps to a sump. Septage from the sump is periodically removed and disposed of off-site by a septic hauler. Effluent from the sump flows to a rock leach pit. The septic system is not permitted by the San Joaquin County Environmental Health Department and therefore this Order requires the system to be in compliance with County requirements.

WATER BALANCE

26. To evaluate the infiltration potential of soils in the location of the EP Pond, three double-ring infiltrometer tests were performed on 16 and 17 November 2005 using the procedure described in ASTM D 3385.

    a. The tests were performed in excavated holes. The bottoms of the holes were at the same elevation where the pond bottom will be located. The tests lasted between 5 and 6.5 hours to allow the infiltration rate to stabilize.

    b. Stabilized infiltration rates were reported to be the following: Test I-1 (0.51 in/hr), I-2 (0.55 in/hr), and I-3 (0.16 in/hr).

27. The RWD contains a water balance for the wastewater system. The water balance was based on a daily wastewater discharge of 20,000 gpd, 100-year annual return rainfall amounts, and a 0.40-acre EP Pond. Based on the calculations, the EP Pond will not accumulate water, even during a 100-year return annual precipitation event. The following safety factors were included in the water balance:

    a. A flowrate of 20,000 gpd was used in the calculations, which is higher than the average measured flowrate of 12,000 gpd.

    b. The percolation rate used in calculations is 50-percent of the measured average percolation rate (0.41 in/hr).

    c. The area used to calculate the percolation only includes the pond bottom and does not include the sloped sidewalls.

d. A pan evaporation adjustment factor of 70-percent was used when calculating evaporation rates.

28. Stormwater that falls on the facility infiltrates or runs off, eventually discharging into the Mokelumene River. Only precipitation that falls directly on the EP Pond was included in the water balance.

WASTEWATER DISPOSAL

29. After treatment, wastewater will be disposed of by evaporation and percolation from the EP Pond. Because the wastewater is of high quality, no additional treatment is required. Although wastewater copper concentrations are sometimes slightly higher than groundwater concentrations, groundwater quality will be protected through attenuation processes as the wastewater infiltrates. The Discharger must continue to optimize the oil removal measures to prevent discharge of petroleum to the EP Pond.

GROUNDWATER CONDITIONS

30. A soil and groundwater investigation was performed at the facility. Three groundwater monitoring wells were installed and one additional boring was drilled from 12 February 2007 through 16 February 2007. The work investigated soil and groundwater conditions at the location of the planned EP Pond. The well construction is summarized below:

Well Name	Units	Screen Interval (bgs)	Total Depth (bgs)	Top of Casing Elev. (msl)
MW-1	Feet	11-26	26.5	122.69
MW-2	Feet	13-28	30	121.72
MW-3	Feet	10-25	25.5	112.27

31. Soil samples were collected from Borings B-1 and MW-1 and were analyzed for selected analytes.

a. Oil and Grease (O&G) was analyzed in three samples from Boring B-1. Concentrations were detected at 13 ft. below ground surface (bgs) (85 mg/L) and 21 ft. bgs (85 mg/L); a sample collected from 13.5 ft. bgs did not contain detectable O&G.

b. O&G was analyzed in two samples from Boring MW-1. A sample collected from 11 ft. bgs did not contain detectable O&G. A sample collected from 16 ft. bgs contained 280 mg/L.

c. Copper was analyzed in three samples from Boring B-1. Concentrations were detected at 11.5 ft. bgs (17.3 mg/L), 13.5 ft. bgs (21.7 mg/L), and 21 ft. bgs (5.08 mg/L).

d. Copper was analyzed in two samples from Boring MW-1. Concentrations were detected at 11 ft. bgs (45.5 mg/L) and at 16 ft. bgs (32.9 mg/L).

32. Groundwater elevations were determined during three sampling events performed in March, April, and May 2007. Groundwater exists approximately 15 to 20 feet below the ground surface. In the three sampling events, groundwater flowed to the south toward the Mokelumne River, which is consistent with the surface topography. Well MW-1 is located upgradient of the EP Pond, Well MW-2 is located cross-gradient of the EP Pond, and Well MW-3 is located downgradient of the EP Pond.

33. Groundwater quality was determined by sampling the groundwater monitoring wells in March, April, and May 2007. A summary of the average groundwater quality is presented below:

Well Name	pH std. unit	TDS (mg/L)	NO_3 (mg/L)	TN (mg/L)	SO_4 (mg/L)	Cl (mg/L)	Br (mg/L)	Cu (ug/L)	K (mg/L)	Na (mg/L)
MW-1	7.0	347	12.8	12.8	19.3	15.3	0.052	ND (4.4)	4.7	16.1
MW-2	7.2	490	0.51	0.60	25.7	40.7	0.19	4.4	11.1	88
MW-3	7.3	200	1.3	1.3	2.5	6.3	0.46	ND (4.4)	5.7	101
WQL	6.5-8.4 [1]	450 [1]	45 [2]	NA	250 [3]	106 [1]	0.0063 [4]	170 [5]	NA	20 [6]

TDS denotes Total Dissolved Solids. NO_3 denotes Nitrate. TN denotes Total Nitrogen. SO_4 denotes Sulfate. Cl denotes Chloride. Br denotes Bromine. Cu denotes Copper. K denotes Potassium. Na denotes Sodium.

[1] Agricultural Water Quality Goals. [2] USEPA Drinking Water MCL. [3] Recommended Secondary Maximum Contaminant Level (Drinking Water). [4] Taste and Odor Threshold. [5] California Public Health Goal
[6] USEPA Health Advisory.

34. Review of the groundwater data indicates the following pattern, which is summarized below:

    a. Well MW-2 typically contains the highest concentrations of constituents of concern including TDS, sulfate, chloride, and potassium. Sodium is slightly higher in Well MW-3, otherwise MW-3 contains lower concentrations of constituents of concern.

    b. The highest nitrate concentration was reported in Well MW-1 (12.8 mg/L). The source of the nitrate in Well MW-1 is unknown but may be related to upgradient agricultural activities

    c. The source of bromine in the wells is unknown but may be related to agricultural use of methyl bromide. However, methyl bromide is unlikely to be used at the facility and the area upgradient of the facility is oak woodlands, likely used for livestock grazing and hay production, which is not an agricultural activity that would employ a soil fumigant like methyl bromide.

35. A soil quality preliminary investigation was performed at the standby-unlined pond in April and May 2004 to determine if petroleum has been released to the environment. Samples were collected from the unlined pond before and after filling the standy-unlined pond with treated wastewater. A background soil sample was taken from native soil outside the pond. The unlined pond soil was sampled a month later after the

wastewater had evaporated and percolated into the soil and the pond was dry. The data indicates some petroleum exists in soil. The source of the petroleum may be wastewater.

Parameter/Date	Native Soil	Standby Pond	Standby Pond
Sample Date	4/15/04	4/15/04	5/19/04
TPH - Motor Oil	ND (10)	ND (10)	17
TPH - Diesel	ND (1.0)	1.1	ND (1.0)

TPH denotes Total Petroleum Hydrocarbons. Motor Oil denotes extractable hydrocarbons from C20 to C32. Diesel denotes extractable hydrocarbons from C8 to C25.

SITE SPECIFIC CONDITIONS

36. Surrounding land uses are primarily agricultural with limited residential use. The topography of the surrounding area is variable.

37. Shallow soils are described by the National Resources Conservation Service as Vina fine sandy loam (infiltration rate 0.6 to 6.0 inches per hour). Deeper soil characterized in the monitoring well borings consists of sand/silt/clay soil types.

38. The mean annual rainfall is approximately 17.46 inches, and the pan evaporation rate for North Camanche Reservoir, Department of Water Resources Clements Station is 54.93 inches. The 100-year return annual precipitation is 33.28 inches.

39. The facility is within the Manteca Hydrologic Area (No. 531.20), as depicted on interagency hydrologic maps prepared by the Department of Water Resources in August 1986.

40. The facility is normally unmanned. The water supply at the facility is non-potable but is supplied for non-potable uses such as toilet flushing and emergency showers. Workers are required to supply their own potable water when at the facility.

41. The site is outside the 100-year flood zone.

BASIN PLAN, BENEFICIAL USES, AND REGULATORY CONSIDERATIONS

42. The *Water Quality Control Plan for the Sacramento River and San Joaquin River Basins, Fourth Edition* (hereafter Basin Plan) designates beneficial uses, establishes water quality objectives, contains implementation plans and policies for protecting waters of the basin, and incorporates by reference plans and policies adopted by the State Water Resources Control Board. Pursuant to Section13263(a) of the California Water Code (CWC), waste discharge requirements must implement the Basin Plan.

43. Surface water drainage is to the Mokelumne River. The Basin Plan designates the beneficial uses of the Mokelumne River from Camanche Reservoir to the Sacramento-San Joaquin Delta are agricultural supply; water contact recreation; noncontact water recreation; warm freshwater habitat, cold freshwater habitat; migration of aquatic

organisms; spawning, reproduction, and/or early development; and wildlife habitat.

44. The beneficial uses of underlying groundwater are municipal and domestic water supply, agricultural supply, industrial service supply, and industrial process supply.

45. State Water Resources Control Board (State Board) Resolution No. 68-16 (the Antidegradation Policy) requires that the Regional Water Board, in regulating the discharge of waste, must maintain the high quality of waters of the state until it is demonstrated that any change in quality will be consistent with maximum benefit to the people of the State, will not unreasonably affect beneficial uses, and will not result in water quality less than that described in the Regional Water Board's policies (e.g., quality that exceeds water quality objectives). Resolution No. 68-16 also requires that waste discharged to high quality waters be required to meet waste discharge requirements that will result in the best practicable treatment or control of the discharge.

46. The Discharger submitted information showing that limited groundwater quality degradation would be in the public interest. The Discharger reported:

    a. The Power House produces 10 megawatts of electricity annually, which is capable of supplying 10,000 homes and represents 0.3-percent of California's total hydroelectric capacity. The hydroelectric energy offsets 22,400 pounds per year of oxides of nitrogen and 98,000 barrels of oil annually.

    b. Best Practicable Treatment and Control (BPTC) has been implemented through source controls to limit both the copper and hydrocarbon constituent concentrations, and system improvements that have resulted in lower wastewater flow rates.

    c. The discharge is unlikely to degrade groundwater concentration and maintenance procedures (such as excavation of waste constituent contaminated soil) can be implemented to prevent groundwater contamination as a result of increasing waste constituents adsorbed to soil in the future.

47. This Order establishes effluent limitations that are protective of the beneficial uses of the underlying groundwater and requires regular sampling of soil in the EP pond to monitor waste constituent concentrations. Based on the results of the scheduled tasks, this Order may be reopened to reconsider effluent limitations and other requirements to comply with Resolution 68-16.

48. California Water Code Section13267(b) provides that: "*In conducting an investigation specified in subdivision (a), the regional board may require that any person who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge waste within its region, or any citizen or domiciliary, or political agency or entity of this state who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge, waste outside of its region that could affect the quality of waters within its region shall furnish, under penalty of perjury, technical or monitoring program reports which the regional board requires. The burden, including costs, of these reports shall bear a reasonable relationship to the need for the report and the benefits to be obtained from the reports. In requiring those*

reports, the regional board shall provide the person with a written explanation with regard to the need for the reports, and shall identify the evidence that supports requiring that person to provide the reports."

The technical reports required by this Order and the attached "Monitoring and Reporting Program No. R5-2008-0071" are necessary to assure compliance with these waste discharge requirements. The Discharger owns and operates the facility that generates the waste subject to this Order.

49. California Department of Water Resources standards for the construction and destruction of groundwater wells is described in *California Well Standards Bulletin 74-90* (June 1991) and *Water Well Standards: State of California Bulletin 94-81* (December 1981). These standards, and any more stringent standards adopted by the state or county pursuant to CWC Section 13801, apply to all monitoring wells.

50. Federal regulations for storm water discharges were promulgated by the U.S. Environmental Protection Agency on 16 November 1990 (40 CFR Parts 122, 123, and 124). The State Board adopted Order No. 97-03-DWQ (General Permit No. CAS000001) specifying waste discharge requirements for discharges of storm water associated with industrial activities, and requiring submittal of a Notice of Intent by all affected industrial dischargers. The facility is exempted (SIC 4931) and not required to comply with the stormwater permit.

51. The action to issue waste discharge requirements for an existing facility is exempt from the provisions of the California Environmental Quality Act (CEQA), Public Resource Code Section21000, et seq., and the CEQA guidelines, as follows:

    a. The pipeline that will be used to redirect wastewater from the separation pond to the infiltration pond is less than one mile in length and is within a public right-of-way. Construction of the pipeline is exempt from CEQA under 14 CCR Section15282(k).

    b. The Camanche Dam Powerhouse, the oil separation ponds and the waste discharges from the oil separation ponds are all existing facilities. The volume of wastewater discharged from the oil separation ponds will not increase.

    c. The construction and operation of the ponds and installation of the pumps at the existing facilities are exempt from CEQA under 14 CCR Section15301 because they are minor alterations of the existing wastewater discharge facilities involving negligible or no expansion of use.

    d. The construction and operation of the ponds and installation of the pumps are also exempt from CEQA under 14 CCR Section 15303 because these are small new equipment or structures appurtenant to the existing facility.

    e. Discharging to the infiltration ponds allows EBMUD to eliminate discharges to the Mokelumne River in order to protect natural resources and the environment. The

issuance of this Order regulating discharges to the infiltration pond is therefore exempt from CEQA under 14 CCR Sections 15307-15308.

52. The discharge of wastewater is exempt from the requirements of *Consolidated Regulation for Treatment, Storage, Processing, or Disposal of Solid Waste*, as set forth in Title 27, CCR, Division 2, Subdivision 1, Section 2005, et seq., (hereafter Title 27). The exemption, pursuant to Section 20090(b), is based on the following:

    a. The Regional Water Board is issuing waste discharge requirements,
    b. The discharge complies with the Basin Plan, and
    c. The wastewater does not need to be managed according to Title 22 CCR, Division 4.5, and Chapter 11, as a hazardous waste.

53. Pursuant to CWC Section13263(g), discharge is a privilege, not a right, and adoption of this Order does not create a vested right to continue the discharge.

PUBLIC NOTICE

54. All the above and the supplemental information and details in the attached Information Sheet, incorporated by reference herein, were considered in establishing the following conditions of discharge.

55. The Discharger and interested agencies and persons were notified of the intent to prescribe WDRs for this discharge and provided an opportunity for a public hearing and an opportunity to submit their written views and recommendations.

56. In a public meeting, all comments pertaining to the discharge were heard and considered.

IT IS HEREBY ORDERED pursuant to Section 13263 and 13267 of the California Water Code, East Bay Municipal Utility District, their agents, successors, and assigns, in order to meet the provisions contained in Division 7 of the CWC and regulations adopted there under, shall comply with the following:

Note: Other prohibitions, conditions, definitions, and the method of determining compliance are contained in the attached "Standard Provisions and Reporting Requirements for Waste Discharge Requirements" dated 1 March 1991.

A. Discharge Prohibitions:

1. After the Discharger obtains authorization as described in Discharge Specification B.2 to change the discharge from the Mokelumne River to the EP Pond, and reports the change complete to the Regional Water Board, discharge of wastes to surface waters or surface water drainage courses is prohibited.

2. Bypass or overflow of untreated or partially treated waste is prohibited with the exception of use of the standby-unlined pond when maintenance is performed on

the oil separation pond. Bypass of wastewater resulting in less effective treatment as described in Finding No. 17d to the standby-unlined pond is prohibited after 30 April 2009.

3. Discharge of waste classified as 'hazardous,' defined in Section 20164 of Title 27, CCR, or 'designated,' as defined in Section 13173 of the CWC, is prohibited.

4. After the Discharger obtains authorization to change the discharge from the Mokelumne River to the EP Pond, the discharge of wastewater other than to the approved EP Pond or the standby-unlined pond identified in Finding No. 29 is prohibited.

5. The discharge of domestic wastewater to the industrial wastewater treatment system is prohibited.

6. The discharge of industrial wastewater to the domestic wastewater treatment system (septic system) is prohibited.

B. Discharge Specifications:

1. The monthly average discharge to the EP Pond shall not exceed 20,000 gallons per day.

2. Before permanently changing the discharge location to the EP Pond, the Discharger shall obtain written authorization from the Executive Officer to begin use of the system described in the report required by Provision No. F.1.f.

3. Neither the treatment nor the discharge shall cause a nuisance or condition of pollution as defined by the CWC, Section 13050.

4. The discharge shall not cause the degradation of any water supply.

5. No waste constituent shall be released or discharged, or placed where it will be released or discharged, in a concentration or in a mass that causes violation of the Groundwater Limitations.

6. Objectionable odors originating at this facility shall not be perceivable beyond the limits of the property owned by the Discharger.

7. As a means of discerning compliance with Discharge Specification No. 6, the dissolved oxygen content in the upper zone (one foot) of any wastewater pond shall not be less than 1.0 mg/L.

8. The Discharger shall operate all systems and equipment to maximize treatment of wastewater and optimize the quality of the discharge.

9. All ponds shall be managed to prevent the breeding of mosquitoes. In particular,

a. An erosion control program should assure that small coves and irregularities are not created around the perimeter of the waste surface.

b. Weeds shall be minimized through control of water depth, harvesting, and/or herbicides.

c. Dead algae, vegetation, and debris shall not accumulate on the water surface.

10. The wastewater treatment and disposal system shall be designed, constructed, operated, and maintained to prevent inundation or washout due to floods with a 100-year return frequency.

11. No physical connection shall exist between wastewater piping and any domestic water supply, domestic/industrial supply well, irrigation water pipeline, or irrigation canal without an air gap or approved reduced pressure device.

12. The freeboard in the EP Pond shall never be less than two feet, as measured vertically from the water surface to the lowest point of overflow.

13. The wastewater treatment and disposal system shall have sufficient capacity to accommodate wastewater flow and seasonal precipitation. Design seasonal precipitation shall be based on total annual precipitation using a return period of 100 years, distributed monthly in accordance with historical rainfall patterns.

14. On or about **15 October** each year, available EP Pond storage capacity shall at least equal the volume necessary to comply with Discharge Specifications No. 12 and No. 13.

15. Public contact with wastewater shall be precluded through such means as property boundary fences and signs. Signs with proper wording of sufficient size shall be placed around the perimeter of the wastewater ponds to alert visitors and workers of the use of wastewater.

16. The Discharger shall comply with all applicable sections of the Aboveground Petroleum Storage Tank Regulations (Section 25270, Health and Safety Code).

C. Effluent Limitations:

1. Wastewater discharged to the EP Pond shall not exceed the following monthly average effluent limits, or lower concentrations as the Discharger determines necessary to ensure compliance with the Groundwater Limitations:

Constituent	Units	Concentration
Total Oil and Grease	mg/L	5.0
Total Copper - Monthly Average	mg/L	0.050
Total Copper - Annual Average [1]	mg/L	0.020

[1] Total Copper - Annual Average shall be calculated and presented in the Annual Report based on the calendar year (January through December).

2. Wastewater in the EP Pond shall not have a pH of less than 6.5 or greater than 10.0.

D. Solids/Sludge Disposal Requirements:

1. Collected screenings, sludge, and other solids removed from the wastewater system shall be disposed of in a manner that is consistent with Title 27, Division 2, Subdivision 1 of the CCR and approved by the Executive Officer.

2. Sludge and other solids shall be removed from sumps, screens, etc. as needed to ensure optimal operation and adequate hydraulic capacity. Solids drying operations if any, shall be designed and operated to prevent leachate generation.

3. Storage and disposal of domestic wastewater sludge (septage) shall comply with existing Federal, State, and local laws and regulations, including permitting requirements and technical standards.

4. Sludge and other solids shall be removed from septic tanks as needed to ensure optimal operation and adequate hydraulic capacity. A duly authorized carrier shall haul sludge, septage, and domestic wastewater.

5. Any proposed change in solids use or disposal practice from a previously approved practice shall be reported to the Executive Officer at least 90 days in advance of the change.

E. Groundwater Limitations:

The discharge, in combination with other sources, shall not cause underlying groundwater to contain waste constituents in concentrations statistically greater than background water quality.

F. Provisions:

1. All of the following reports shall be submitted pursuant to CWC Section 13267, and prepared by a California registered professional as described in Provision F.2.

   a. By **17 June 2008**, the Discharger shall submit a completed septic system permit application to the San Joaquin County Department of Public Health.

   b. By **17 June 2008**, the Discharger shall submit and begin implementing a *Wastewater System Improvement Workplan* that describes the improvements that are required to cease the surface water discharge and begin to land apply the industrial wastewater. However, the discharge shall not be diverted to the EP Pond until authorization from the Executive Officer is received (although short term tests of improvements are acceptable under this provision). The *Workplan* shall include a project schedule that shows all improvements will be completed by **1 September 2008**.

c. By **17 June 2008**, the Discharger shall submit a *Soil Sampling and Analysis Plan* for monitoring the EP Pond bottom for waste constituent concentrations.

d. By **17 June 2008**, the Discharger shall submit and implement an *Operation and Management Plan* (*O&M Plan*) that addresses operation of the wastewater treatment and disposal facility. At a minimum, the *O&M Plan* will describe (a) the daily operation and maintenance of the treatment system, (b) the practices used to treat the wastewater within limits specified in this Order, (c) the location of the EP Pond, (d) the locations of flow meter(s) and effluent sampling points, (e) quality control sampling procedures, (f) solid waste disposal methods, (g) wastewater notification signs, (h) berm maintenance and vector control, and (i) a description of automatic alarms and notification systems . A copy of the *O&M Plan* shall be kept at the facility for reference by operating personnel and they shall be familiar with its contents.

e. By **17 June 2008**, the Discharger shall submit a *Petroleum Control Workplan* that describes improvements that will be implemented to prevent petroleum from being discharged to the environment via the standby-unlined pond. The Workplan shall include a schedule that shows improvements will be completed by 30 April 2009.

f. By **1 September 2008**, the Discharger shall submit a request to begin discharging wastewater to the EP Pond. The request shall include a *Wastewater System Improvement As-Built or Record Drawings Report* for the wastewater system improvements. The report shall document that the EP Pond system is completed, tested, and ready for use.

g. **Within 90 days** of obtaining Executive Officer approval to begin discharging wastewater to the EP Pond, the Discharger shall report the change to land discharge is complete and submit a request to the Regional Water Board to rescind WDRs Order No. R5-2003-0153 NPDES Order No. CA0082040. Until Order No. R5-2003-0153 is rescinded, it is in full effect and all monitoring is required in addition to that required by this Order.

h. By **30 April 2009**, the Discharger shall submit a *Petroleum Implementation Report* that describes the changes implemented to operation of the standby-unlined pond that prevents petroleum discharge to the environment.

2. In accordance with California Business and Professions Code Sections 6735, 7835, and 7835.1, engineering and geologic evaluations and judgments shall be performed by or under the direction of registered professionals competent and proficient in the fields pertinent to the required activities. All technical reports specified herein that contain workplans for, that describe the conduct of investigations and studies, or that contain technical conclusions and recommendations concerning engineering and geology shall be prepared by or under the direction of appropriately qualified professional(s), even if not explicitly stated. Each technical report submitted by the Discharger shall contain a statement of qualifications of the responsible licensed professional(s) as well as

the professional's signature and/or stamp of the seal.

3. The Discharger shall comply with the Monitoring and Reporting Program No. R5-2008-0071, which is part of this Order, and any revisions thereto as ordered by the Executive Officer.

4. The Discharger shall comply with the "Standard Provisions and Reporting Requirements for Waste Discharge Requirements", dated 1 March 1991, which are attached hereto and by reference a part of this Order. This attachment and its individual paragraphs are commonly referenced as "Standard Provision(s)."

5. If EP Pond bottom soil monitoring results show that the discharge of waste is causing the copper or petroleum concentration in soil to increase, then within **120 days** of the request of the Executive Officer, the Discharger shall submit a *BPTC Evaluation Workplan* that sets forth the scope and schedule for a systematic and comprehensive technical evaluation of each component of the facility's waste treatment and disposal system to determine best practicable treatment and control for the copper and/or petroleum concentration. The schedule to complete the evaluation shall be as short as practicable, and shall not exceed one year.

6. In the event of any change in control or ownership of the facility or wastewater disposal areas, the Discharger must notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be immediately forwarded to this office. To assume operation as Discharger under this Order, the succeeding owner or operator must apply in writing to the Executive Officer requesting transfer of the Order. The request must contain the requesting entity's full legal name, the state of incorporation if a corporation, the name and address and telephone number of the persons responsible for contact with the Regional Water Board, and a statement. The statement shall comply with the signatory paragraph of Standard Provision B.3 and state that the new owner or operator assumes full responsibility for compliance with this Order. Failure to submit the request shall be considered a discharge without requirements, a violation of the California Water Code. Transfer shall be approved or disapproved by the Executive Officer.

7. The Discharger shall submit to the Regional Water Board on or before each compliance report due date the specified document, or if appropriate, a written report detailing compliance or noncompliance with the specific schedule date and task. If noncompliance is reported, then the Discharger shall state the reasons for noncompliance and shall provide a schedule to come into compliance.

8. The Discharger shall report to the Regional Water Board any toxic chemical release data it reports to the State Emergency Response Commission within15 days of reporting the data to the Commission pursuant to Section 313 of the "Emergency Planning and Community Right to Know Act of 1986."

9. The Discharger shall report promptly to the Board any material change or proposed change in the character, location, or volume of the discharge.

10. The Discharger must comply with all conditions of this Order, including timely submittal of technical and monitoring reports as directed by the Executive Officer. Violations may result in enforcement action, including Regional Water Board or court orders requiring corrective action or imposing civil monetary liability, or in revision or recession of this Order.

11. A copy of this Order shall be kept at the discharge facility for reference by operating personnel. Key operating personnel shall be familiar with its contents.

12. The Regional Water Board will review this Order periodically and will revise requirements when necessary.

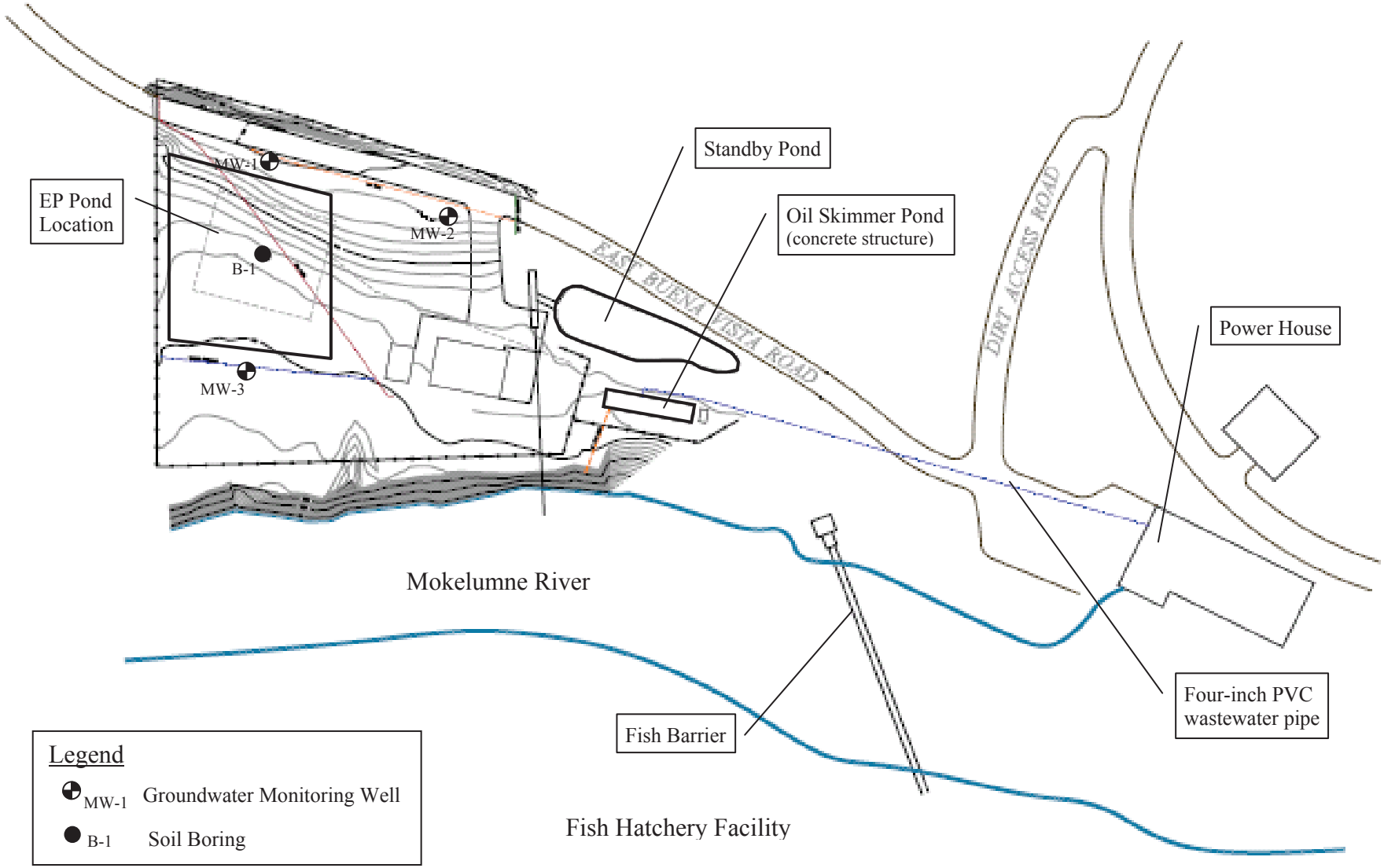
I, PAMELA C. CREEDON, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on 25 April 2008.

Original signed by

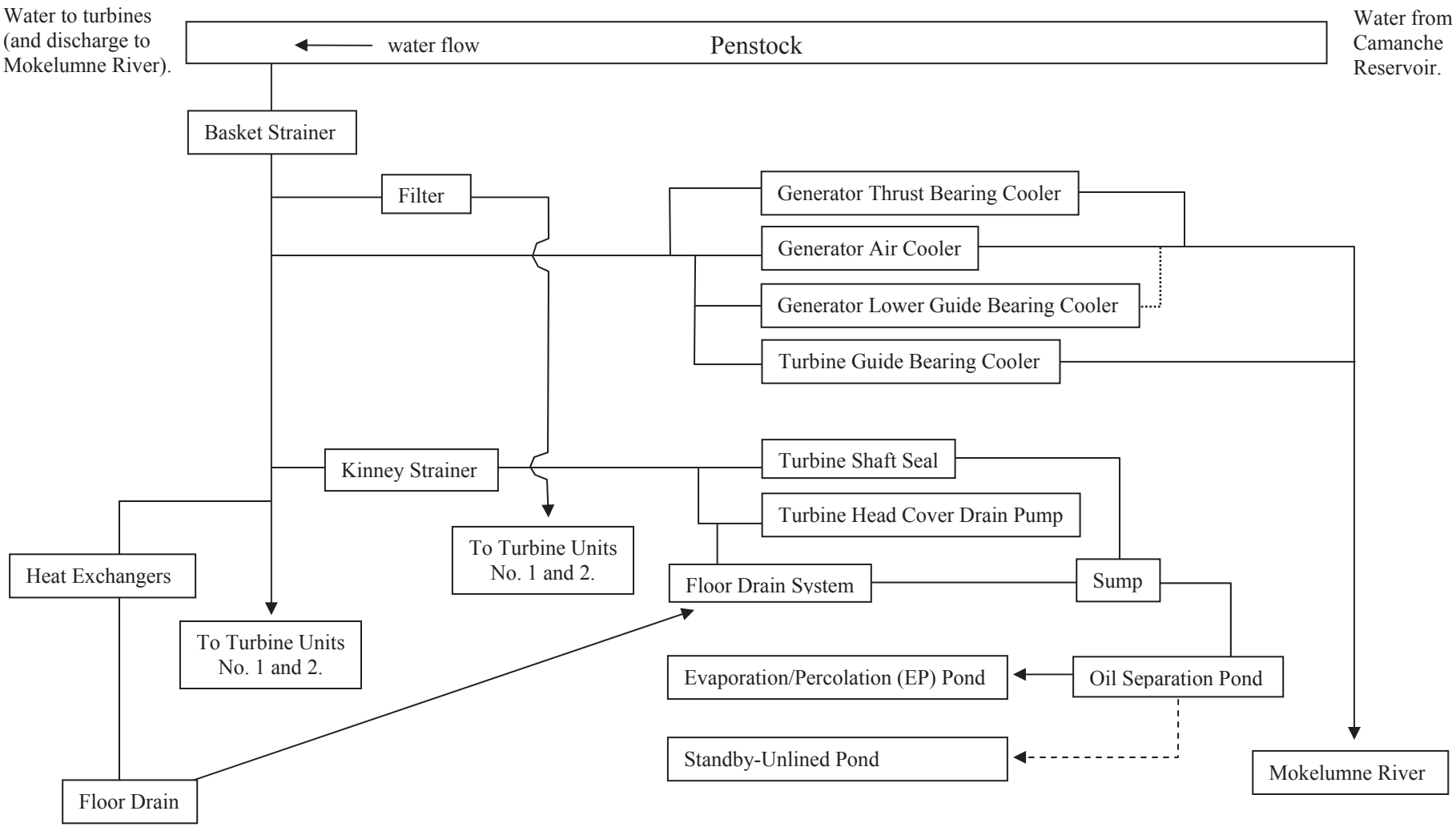
PAMELA C. CREEDON, Executive Officer

TRO: 5/1/08

Drawing Reference: U.S.G.S Clements Topographic Map 7.5 Minute Quad	**SITE LOCATION MAP** Camanche Dam Power House 23900 E. Buena Vista Road Clements, CA 95227	N W E S approx. scale 1 in. = 2,100 ft.



Approximate Scale 1 in ≈ 130 ft. N W E S	Drawing Reference: Modified from Figure 2 Sept. 2007 Report of Waste Discharge Conestoga-Rovers & Associates	SITE PLAN EAST BAY MUNICIPAL UTILITY DISTRICT CAMANCHE DAM POWERHOUSE SAN JOAQUIN COUNTY



no scale	Drawing Reference: Report of Waste Discharge, 9/21/07 Figure 3	**WASTEWATER SYSTEM SCHEMATIC** EBMUD, Camanche Reservoir San Joaquin County

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. R5-2008-0071

FOR

EAST BAY MUNICIPAL UTILITY DISTRICT
CAMANCHE DAM POWER HOUSE
SAN JOAQUIN COUNTY

This Monitoring and Reporting Program (MRP) describes requirements for monitoring influent wastewater, treated effluent, wastewater ponds, and pond soil quality. This MRP is issued pursuant to Water Code Section 13267. The Discharger shall not implement any changes to this MRP unless and until a revised MRP is issued by the Executive Officer. Regional Board staff shall approve specific sample station locations prior to implementation of sampling activities.

This MRP is effective upon date of signature; however, portions of the MRP will not be relevant until the wastewater discharge location is changed to the EP Pond. In the meantime, the Discharger shall submit the monitoring data as described in the "Reporting" section of this MRP and all requirements of WDRs Order No. R5-2003-0153 until that order is rescinded.

All samples shall be representative of the volume and nature of the discharge or matrix of material sampled. The time, date, and location of each grab sample shall be recorded on the sample chain of custody form. Field test instruments (such as those used to measure pH and dissolved oxygen) may be used provided that:

1. The operator is trained in proper use and maintenance of the instruments;
2. The instruments are calibrated prior to each monitoring event;
3. The instruments are serviced and/or calibrated by the manufacturer at the recommended frequency; and
4. Field calibration reports are submitted as described in the "Reporting" section of the MRP.

INFLUENT MONITORING

Influent flow monitoring shall be performed upstream of the oil separation pond. Influent monitoring shall include the following:

Constituent	Units	Type of Sample	Sampling Frequency	Reporting Frequency
Flow[1]	gpd	Continuous Meter	Daily	Quarterly
Average Daily Flow[2]	gpd	Calculated	Monthly	Quarterly

[1] Flow represents the daily flow rate.
[2] Average Daily Flow represents the daily flow rate averaged over the month.

EFFLUENT MONITORING

Effluent samples shall be collected immediately downstream of the oil separation pond, and prior to discharge to the EP Pond. All samples shall be representative of the volume and

nature of the discharge. Effluent monitoring shall include the following:

Constituent	Units	Type of Sample	Sampling Frequency	Reporting Frequency
Total Oil and Grease	mg/L	Grab	Monthly	Quarterly
Electrical Conductivity	umhos/cm	Grab	Monthly	Quarterly
Total Copper	ug/L	Grab	Monthly	Quarterly
Total Dissolved Copper	ug/L	Grab	Monthly	Quarterly
Fixed Dissolved Solids	mg/L	Grab	Quarterly	Quarterly

EVAPORATION/PERCOLATION (EP) AND STANDBY POND MONITORING

Each pond shall be monitored when in use and when there is a minimum of one-foot of water as specified below:

Constituent	Units	Type of Sample	Sampling Frequency	Reporting Frequency
Dissolved Oxygen [1]	mg/L	Grab	Monthly	Quarterly
Freeboard	0.1 feet	Measurement	Weekly	Quarterly
pH [1]	Standard	Grab	Monthly	Quarterly
Odors	--	Observation	Monthly	Quarterly
Berm condition	--	Observation	Monthly	Quarterly
Petroleum Sheen	--	Observation	Monthly	Quarterly

[1] Samples shall be collected at a depth of one foot from each pond in use, opposite the inlet. Samples shall be collected between 0700 and 0900 hours.

EP AND STANDBY POND SOIL SAMPLING

Soil samples shall be collected from the bottom of the EP and Standby ponds as specified below and described in the approved *Soil Sampling and Analysis Plan*. If no wastewater was discharged to the Standby pond during the quarter, the monitoring for that pond is not required.

Constituent	Units	Type of Sample	Sampling Frequency	Reporting Frequency
Total Copper	mg/kg	Grab	Annual	Annual
Total Oil and Grease	mg/kg	Grab	Annual	Annual

REPORTING

In reporting monitoring data, the District shall arrange the data in tabular form so that the date, sample type (e.g., effluent, pond, etc.), and reported analytical result for each sample is readily discernible. The data shall be summarized in such a manner to clearly illustrate compliance with waste discharge requirements and spatial or temporal trends, as applicable. The results of any monitoring done more frequently than required at the locations specified in the Monitoring and Reporting Program shall be reported to the Regional Water Board.

As required by the California Business and Professions Code Sections 6735, 7835, and 7835.1, all soil sampling reports shall be prepared under the direct supervision of a Registered Engineer or Geologist and signed by the registered professional.

A. Quarterly Monitoring Reports

Daily, weekly, and monthly monitoring data shall be reported in quarterly monitoring reports. Quarterly monitoring reports shall be submitted to the Board by the **1st day of the second month after the quarter** (i.e. the January-March quarterly report is due by May 1st) At a minimum, the reports shall include:

1. The report shall include the following:
    a. Results of influent; effluent; and EP and Standby Ponds;
    b. A comparison of monitoring data to the discharge specifications and an explanation of any violation of those requirements. Data shall be presented in tabular format;
    c. If requested by staff, copies of laboratory analytical report(s); and
    d. A calibration log verifying calibration of all hand-held monitoring instruments and devices used to comply with the prescribed monitoring program.
    e. When appropriate, the results of sampling the bottom of the EP Pond and/or standby-unlined pond soil sampling.

B. Annual Report

An Annual Report shall be prepared as the fourth quarter monitoring report. The Annual Report will include all monitoring data required in the quarterly schedule. The Annual Report shall be submitted to the Regional Board by **1 February** each year. In addition to the data normally presented, the Annual Report shall include the following:

1. If requested by staff, tabular and graphical summaries of all data collected during the year;
2. A discussion of compliance and the corrective actions taken, as well as any planned or proposed actions needed to bring the discharge into full compliance with the waste discharge requirements;
3. Calculation of Total Copper - Annual Average as described in Effluent Limitation C.1.
4. A discussion of any data gaps and potential deficiencies/redundancies in the monitoring system or reporting program;
5. Summary of septic tank pumping activity;

6. Equipment maintenance and calibration records, as described in Standard Provision No. C.4;
7. A forecast of influent flows, as described in Standard Provision No. E.4;

A letter transmitting the self-monitoring reports shall accompany each report. Such a letter shall include a discussion of requirement violations found during the reporting period, and actions taken or planned for correcting noted violations, such as operation or facility modifications. If the Discharger has previously submitted a report describing corrective actions and/or a time schedule for implementing the corrective actions, reference to the previous correspondence will be satisfactory. The transmittal letter shall contain the penalty of perjury statement by the Discharger, or the Discharger's authorized agent, as described in the Standard Provisions General Reporting Requirements Section B.3.

The Discharger shall implement the above monitoring program on the first day of the month following adoption of this Order.

Ordered by: Original signed by

PAMELA C. CREEDON, Executive Officer

(Date)

TRO: 5/1/08

INFORMATION SHEET

ORDER NO. R5-2008-0071

EAST BAY MUNICIPAL UTILITY DISTRICT
CAMANCHE DAM POWER HOUSE
SAN JOAQUIN COUNTY

East Bay Municipal Utility District (EBMUD) hereafter Discharger, owns and operates a hydroelectric generating Power House at 23900 E. Buena Vista Road, Clements, San Joaquin County. The Discharger submitted a Report of Waste Discharge (RWD) dated 21 September 2007 for treatment and land application of wastewater generated at the Camanche Dam Power House.

Background

Three hydro-powered turbine generators are operated at the Power House and are capable of producing up to 10 million kilowatts of electricity per year. Approximately 12,000 gallons per day (gpd) of wastewater is generated in the Power House. The Discharger treats the industrial wastewater to remove petroleum products (used for lubrication in the turbines) and discharges the treated effluent to the Mokelumne River downstream of Camanche Dam under a National Pollutant Discharge Elimination System (NPDES) permit.

The NPDES permit contains effluent limitations for copper and other analytes; because the Mokelumne River is listed as impaired for copper under the Clean Water Act (CWA), Section 303(d), increasingly stringent copper concentration discharge limits are imposed beginning 1 October 2008. The Discharger has reported copper concentrations upstream of the Power House that exceed the discharge limits that would be imposed on 1 October 2008 if the NPDES discharge were continued. The Discharger has attempted to reduce the concentration of copper in wastewater effluent, but has determined that it is technically infeasible to reduce copper to concentrations that will consistently comply with the new limits. Rather than attempt to improve treatment to reduce already low concentrations, the Discharger has elected to switch the discharge from surface water to land and will construct an Evaporation/Percolation (EP) Pond.

Wastewater Treatment

Wastewater is generated from several sources in the Power House generally through cooling, lubricating, heat exchange, and liquid seals. Several sources of cooling water are entirely contained within jackets and have no contact with bearings or lubricating oil. That water is directly discharged to the Mokelumne River. The wastewater that can become contaminated with petroleum hydrocarbons (lubricating oil) and copper through use in the Power House is collected in a sump, skimmed to remove oil, pumped to an oil separation pond for additional skimming, and discharged. Historically, the discharge has been to the Mokelumne River; the Discharger will switch the discharge point to the EP Pond. A standby-unlined pond with a capacity of 85,000 gallons is located adjacent to the oil separation pond and is used when the oil separation pond undergoes scheduled maintenance. Discharge to the standby-unlined pond can result in petroleum being discharged to the environment and this Order requires

improvements to be completed within one year of adoption of this Order to control the petroleum discharge.

In addition to treating the wastewater, the Discharger has completed improvements in the Power House to minimize the quantity of wastewater generated. The flow rate has been reduced from over 90,000 gpd to an average of less than 15,000 gpd. Since January 2004 the flow rate has averaged 12,000 gpd.

The Discharger has changed copper or bronze equipment to reduce the concentration of copper in wastewater. The work resulted in a reduction of median copper values from 8.5 to 6.6 ug/L. Copper concentrations in water upstream of the Power House are generally approximately equal to the concentrations downstream of the Power House (after the wastewater has been discharged). In the years from 2004 through 2007, upstream concentrations ranged from 1.11 to 3.37 ug/L, downstream concentrations ranged from 3.67 to 0.97 ug/L. Removal of petroleum hydrocarbons from the wastewater has been effective, consistently removing the contaminant to below the analytical method detection limit (1.0 to 2.6 mg/L). The discharge to the standby-unlined pond may be of concern because one of two oil skimmers is taken out of service when the oil separation pond is cleaned and the wastewater is discharged to the standby-unlined pond.

Wastewater Disposal

Wastewater will be disposed of by evaporation and percolation from the EP Pond. Because the wastewater is of high quality, no additional treatment is required. Although wastewater copper concentrations are sometimes slightly higher than groundwater concentrations, groundwater quality will be protected through attenuation processes as the wastewater infiltrates.

Percolation capacity was determined by performing three double-ring infiltrometer tests on 16 and 17 November 2005. Infiltration rates were determined to vary from 0.16 to 0.55 in/hr. The infiltration data was used in preparation of a water balance that forecast the EP Pond would go dry in August during a 100-year return annual precipitation event. Stormwater that falls on the facility infiltrates or runs off, eventually discharging into the Mokelumene River. Only precipitation that falls directly on the EP Pond was included in the water balance.

The Power House is equipped with a septic tank that pumps to a sump. Clarified water is discharged to a leach pit. The system is not permitted by the San Joaquin County Environmental Health Department but is required to be by June 2008.

Basin Plan, Beneficial Uses, and Regulatory Considerations

Surface water from the WWTF is to the Mokelumne River between Camanche Reservoir and the Delta. The beneficial uses are agricultural supply; water contact recreation; non-contact

water recreation; warm freshwater habitat; cold freshwater habitat; migration of aquatic organisms; spawning, reproduction, and/or early development; and wildlife habitat
The *Water Quality Control Plan for the California Regional Water Quality Control Board Central Valley Region, Fourth Edition* (Basin Plan), designates beneficial uses, establishes water quality objectives, and contains implementation plans and policies for all waters of the Basin. Beneficial uses often determine the water quality objectives that apply to a water body. For example, waters designated as municipal and domestic supply must meet the Maximum Contaminant Levels (MCLs) for drinking waters. The Basin Plan sets forth the applicable beneficial uses (industrial, agricultural, and domestic and municipal supply in this instance) of groundwater, procedure for application of water quality objectives, and the process for and factors to consider in allocating waste assimilation capacity.

Antidegradation

The antidegradation directives of State Water Board Resolution No. 68-16, "Statement of Policy With Respect to Maintaining High Quality Waters in California," or "Antidegradation Policy" require that waters of the State that are better in quality than established water quality objectives be maintained "consistent with the maximum benefit to the people of the State." Waters can be of high quality for some constituents or beneficial uses and not others. Policies and procedures for complying with this directive are set forth in the Basin Plan.

Resolution 68-16 is applied on a case-by-case, constituent-by-constituent basis in determining whether a certain degree of degradation can be justified. It is incumbent upon the Discharger to provide technical information for the Regional Board to evaluate that fully characterizes:

- All waste constituents to be discharged;
- The background water quality of the uppermost layer of the uppermost aquifer;
- The background quality of other waters that may be affected;
- The underlying hydrogeologic conditions;
- Waste treatment and control measures;
- How treatment and control measures are justified as best practicable treatment and control;
- The extent the discharge will impact the quality of each aquifer; and
- The expected degree of degradation below water quality objectives.

In allowing a discharge, the Regional Water Board must comply with CWC Section 13263 in setting appropriate conditions. The Regional Water Board is required, relative to the groundwater that may be affected by the discharge, to implement the Basin Plan and consider the beneficial uses to be protected along with the water quality objectives essential for that purpose. The Regional Board need not authorize the full utilization of the waste assimilation capacity of the groundwater (CWC 13263(b)) and must consider other waste discharges and factors that affect that capacity.

Certain wastewater constituents are not fully amenable to waste treatment and control and it is reasonable to expect some impact on groundwater quality. Some degradation for certain constituents is consistent with maximum benefit to the people of California because the technology, energy, water recycling, and waste management advantages of hydroelectric power generation facility far outweigh the environmental impact that would be required to replace lost power generation. Economic prosperity of local communities is of maximum benefit to the people of California, and therefore sufficient reason to accommodate wastewater discharge provided terms of reasonable degradation are defined and met. The proposed Order authorizes some degradation consistent with the maximum benefit to the People of the State but does not authorize pollution (i.e., violation of any water quality objective).

Title 27

Title 27, CCR, Section 20005 et seq. ("Title 27"), contains regulations to address certain discharges to land. Title 27 establishes a waste classification system, specifies siting and construction standards for containment of classified waste, requires extensive monitoring of groundwater and the unsaturated zone for any indication of failure of containment, and specifies closure and post-closure maintenance requirements. Generally, no degradation of groundwater quality by any waste constituent is acceptable under Title 27 regulations.

Discharges of wastewater to land is exempt from the requirements of Title 27 if the applicable Regional Water Board has issued WDRs, the discharge is in compliance with the applicable water quality control plan, and the wastewater does not need to be managed according to Chapter 11, Division 4.5, Title 22 of the California Code of Regulations as a hazardous waste.

Proposed Order Terms and Conditions

Discharge Prohibitions and Specifications

The proposed Order's Effluent Limitations for total oil and grease and total copper are based on groundwater quality protection. The oil and grease limit is the same as the limit in the NPDES Order. The Discharger has complied with the limit. The copper limit is 0.020 mg/L. The concentration of copper (both total and dissolved) in effluent samples have been lower than the effluent limit. The discharge specifications regarding dissolved oxygen and freeboard are consistent with Regional Board policy for the prevention of nuisance conditions and overtopping, and are applied to all such facilities.

Monitoring Requirements

Section 13267 of the CWC authorizes the Regional Board to require monitoring and technical reports as necessary to investigate the impact of a waste discharge on waters of the state. In recent years there has been increased emphasis on obtaining all necessary information, assuring the information is timely as well as representative and accurate, and thereby

improving accountability of any discharger for meeting the conditions of discharge. Section 13268 of the CWC authorizes assessment of civil administrative liability where appropriate.

The proposed Order includes influent/effluent monitoring requirements and wastewater pond monitoring. In order to adequately characterize the effluent, the Discharger is required to monitor for petroleum hydrocarbons, fixed dissolved solids, and copper. Monitoring of copper and petroleum concentrations in soil at the bottom of the EP Pond is required on an annual basis. To ensure that storage ponds do not create nuisance conditions, the Discharger is required to monitor dissolved oxygen weekly.

The Discharger must monitor wastewater for constituents expected to be present in the discharge, capable of reaching groundwater, and violating groundwater limitations if treatment, control, and environmental attenuation proves inadequate.

Reopener

The conditions of discharge in the proposed Order were developed based on currently available technical information and applicable water quality laws, regulations, policies, and plans, and are intended to assure conformance with them. However, information is presently insufficient to develop final recycled water and groundwater limitations, so the proposed Order contains interim limitations. Additional information must be developed and documented by the Discharger as required by schedules set forth in the proposed Order. As this additional information is obtained, decisions will be made concerning the best means of assuring the highest water quality possible and that could involve substantial cost. It may be appropriate to reopen the Order if applicable laws and regulations change, but the mere possibility that such laws and regulations may change is not sufficient basis for reopening the Order. The CWC requires that WDRs implement all applicable requirements.

TRO: 5/1/08

B-2

CA Department of Fish and Wildlife and EBMUD River Fish Hatchery

2 May 2012

CERTIFIED MAIL
7011 2970 0003 8939 1088

Katherine A. Hill
Program Manager
California Department of Fish and Game
1701 Nimbus Road, Suite a
Rancho Cordova, CA 95670

CERTIFIED MAIL
7011 2970 0003 8939 1095

Jose Setka
East Bay Municipal Utility District
Fisheries and Wildlife Division
1 Winemasters Way, Suite 'K'
Lodi , CA 95240

NOTICE OF APPLICABILITY; GENERAL WASTE DISCHARGE REQUIREMENTS FOR COLD WATER CONCENTRATED AQUATIC ANIMAL PRODUCTION FACILITY DISCHARGES TO SURFACE WATERS, ORDER R5-2010-0018 (CAAP GENERAL ORDER); STATE OF CALIFORNIA DEPARTMENT OF FISH AND GAME AND EAST BAY MUNICIPAL UTILITY DISTRICT, MOKELUMNE RIVER FISH HATCHERY, SAN JOAQUIN COUNTY

Our office received a Report of Waste Discharge dated 12 April 2012 from State of California Department of Fish and Game for the Mokelumne River Fish Hatchery (Facility). California Regional Water Quality Control Board, Central Valley Region (Central Valley Water Board) staff has determined that the Facility meets the required conditions for approval under the CAAP General Order. The Mokelumne River Fish Hatchery has been assigned CAAP General Order R5-2010-0018-017 and National Pollutant Discharge Elimination System (NPDES) Permit No. CAG135001. Administrative information for the Facility is provided in Enclosure A, a location map is provided in Enclosure B, and a flow schematic is provided in Enclosure C, which are included as part of this Notice of Applicability (NOA). Please reference your CAAP General Order **R5-2010-0018-017**, in all your correspondence and submitted documents.

The CAAP General Order is enclosed and may also be viewed at the following web address: http://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/general_orders/r5-2010-0018-01.pdf

You are urged to familiarize yourself with the contents of the entire CAAP General Order. The CAAP facility operations and discharge shall be managed in accordance with the requirements contained in the CAAP General Order, this NOA, and with the information submitted by the Discharger. Attachment C of the General Order prescribes mandatory monitoring and reporting requirements.

CAAP General Order R5-2010-0018-017 shall become effective when the existing individual NPDES permit for the Facility, Order R5-2004-0122 (NPDES No. CA0004791), is rescinded by a separate action of the Central Valley Water Board, which is scheduled for **7/8 June 2012**.

FACILITY INFORMATION/DISCHARGE DESCRIPTION

The State of California Department of Fish and Game operates the Facility. The Facility and property are owned by the East Bay Municipal Utility District. The California Department of Fish and Game and East Bay Municipal Utility District (EBMUD) are hereafter designated as the Discharger.

The Facility is located on the south bank of the Mokelumne River immediately downstream from Camanche Dam, in Section 6, T4N, R6E, MDB&M at approximately Latitude 38˚13'29"N and Longitude 121˚01'29"W as shown in Enclosure B, a part of this NOA. The Facility includes two fish ladders, a gathering tank and four holding ponds, 20 raceways, 48 fiberglass troughs, a hatchery spawning and incubation building, two stand alone fish tanks, and an office/shop/freezer building. Based on information in the Report of Waste Discharge, the Facility has an annual average fish production of 110,000 pounds (lbs) of Chinook salmon and 65,000 lbs of steelhead trout, and an annual feed of 105,000 lbs of fish pellets.

The Facility receives its source water from the Camanche Reservoir by gravity. The source water is piped directly to packed column aerators at the head of each raceway and holding ponds, and/or directly to sand filters upstream of the hatchery building and incubators. The Facility has a design maximum flow rate of 46 million gallons per day (mgd) of flow-through water. There are two drain systems for each raceway series, one draining through the gathering tank and fish ladders, and one allowing wastewater to be diverted to settling ponds. All water is used on a flow-through basis, and the process wastewater is discharged to the Mokulmne River through three outfalls (001, 002, and 003) as shown in Enclosure C, a part of this NOA, and as described below:

Outfall 001 – The settling pond overflow is discharged to the Mokelumne River through this outfall. Raceway cleaning wastewater is diverted into a separate drain system, gravity fed to the raceway pump station and pumped to an earthen settling pond. Wastewater from the hatchery building and storm water runoff is also discharged from this outfall. The estimated flow from this outfall ranges between 50,000 gallons/day to 25.6 mgd.

Outfall 002 – Wastewater discharges from raceways and holding ponds. The estimated flow from this outfall is 29 mgd.

Outfall 003 – Wastewater discharges from sand filter backwash and two stand alone fish tanks. Excess flow from the raceways and holding ponds discharging to the Outfall 002 is also routed occasionally to this outfall. The estimated flow from this outfall ranges between 2 mgd to 22 mgd.

The Discharger also indicated in the Report of Waste Discharge the use of the following drugs and chemicals at the Facility to treat fish for parasites, fungi, and bacteria, as well as to clean rearing raceways in order to reduce the spread of disease among the confined fish population: sodium chloride (salt), hydrogen peroxide, potassium permanganate, oxytetracycline as a feed additive, vibrio vaccine, iodine, tricaine methanesulfonate (MS-222), florfenicol, amoxycillin, sodium bicarbonate, erythromyacin, acetic acid, carbon dioxide, chloramine T, and SLICE (emamectin benzoate).

All domestic wastewater is discharged to one of four on-site septic systems serving the Facility, one for a permanent residential trailer, two serving two residential houses, and one for the hatchery buildings. The hatchery septic system has an underground pump station vault located on the hatchery grounds that pumps domestic wastewater from the facility restrooms to a leachfield above the residences. The residences are located one quarter mile off hatchery grounds. The septic system is regulated by the County of San Joaquin.

INTAKE WATER CREDITS

The maximum effluent concentrations for copper and zinc exceed the screening levels specified in Table H-1 of the CAAP General Order. The Discharger, however, has demonstrated that the discharge from the Facility meets the conditions for granting intake water credits for copper and zinc. The source of the pollutants is the intake from the receiving water, which is the same water body that the Facility discharges. Based on the Discharger's priority pollutant sampling data collected on 8 February 2007 and 9 October 2008, the screening levels for copper and zinc were exceeded in the intake water. However, the effluent concentrations did not exceed the intake concentrations and the Discharger does not add copper or zinc in the process. Therefore, the water quality-based effluent limitations for copper and zinc have been established considering intake water credits.

EFFLUENT LIMITATIONS

Effluent limitations are specified in Section V. EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS of the CAAP General Order. **Effective 7 June 2012**, the following effluent limitations are applicable to this discharge as found in Section V. A and B of the CAAP General Order:

1. ***Total Suspended Solids, Settleable Solids, Formaldehyde, and Chlorine*** – The Discharger shall comply with the effluent limitations required in Section V.A.1 (Table 1) for total suspended solids, settleable solids, formaldehyde, and chlorine.

2. ***Total Recoverable Zinc*** – An intake water credit has been granted for zinc. In accordance with Section V.A.2, the monthly average total recoverable zinc concentration and mass in the effluent shall not exceed the corresponding monthly average concentration and mass as measured in the influent.

3. ***pH*** – The Discharger shall comply with the effluent limitations required in Section V.B.1.a for pH.

4. ***Total Recoverable Copper*** – The Discharger shall comply with the effluent limitations required in Section V.B.3.c for total recoverable copper. An intake water credit has been granted for copper; therefore, compliance with this limitation is in accordance with the application of intake water credits in Section V.B.3.d.

MONITORING REQUIREMENTS

The CAAP General Order requires that the Discharger complies with the Monitoring and Reporting Program that is incorporated as Attachment C to the CAAP General Order. Influent, effluent, and receiving water monitoring requirements are based on the pounds of aquatic animals produced. This Facility is in the category of production of more than 100,000 pounds of fish produced per year.

Site-specific monitoring locations for influent, effluent and receiving water monitoring are shown in Enclosure C to this NOA (Flow Schematic), and as described in the following table:

Monitoring Locations

Discharge Point Name	Monitoring Location Name	Monitoring Location Description
--	INF-001	**Mokelumne River Intake.** Location where influent sample can be collected prior to entering the Mokelumne River Fish Hatchery.
Outfall 001	EFF-001[1]	Effluent wastewater flow from the **Settling Ponds and Hatchery Building/Spawning Operation** prior to discharge to the Mokelumne River.
Outfall 002	EFF-002	Effluent wastewater flow from the **Raceways** and **Holding Ponds** prior to discharge to the Mokelumne River
Outfall 003	EFF-003	Effluent wastewater flow **Sand Filter Backwash** and **Stand Alone Fish Tanks** prior to discharge to the Mokelumne River
--	EFF-004[2]	Effluent wastewater flow from the **Settling Ponds** prior to mixing with storm water run-off and wastewater from hatchery building/spawning operation.
--	EFF-005[2]	Effluent wastewater flow from the **Hatchery Building/Spawining Operations** prior to mixing with storm water run-off and baked-up receiving water..
--	RSW-001	100 feet **downstream** of Outfall 001 discharge to the Mokelumne River.

[1] *Sampling required when receiving water elevations do not cause backup in Outfall 001*
[2] *Sampling required when receiving water elevations cause backup in Outfall 001. Self monitoring report must indicate that receiving water elevations caused backup in Outfall 001.*

Effective 7 June 2012, the Discharger is required to comply with all the Monitoring and Reporting Requirements contained in Attachment C to the CAAP General Order for facilities with production greater than 100,000 pounds of fish per year. A summary of the monitoring requirements is provided below:

1. ***Influent Monitoring*** – The Discharger shall monitor the influent in accordance with Table C-2 of the CAAP General Order for total suspended solids, settleable solids, pH, electrical conductivity @25ºC, copper (total recoverable), and hardness.

   The Discharger has been granted intake water credits for copper (total recoverable) and zinc (total recoverable). Therefore, in accordance with Section III.C (Influent Monitoring for Facilities with Intake Water Credits), influent monitoring is required for flow, copper (total recoverable), and zinc (total recoverable). Influent copper (total recoverable) shall be monitored as required in Table C-2, and quarterly influent grab samples shall be collected for zinc (total recoverable). Samples for copper (total recoverable) and zinc (total recoverable) must be taken simultaneously from the influent and effluent or phased to account for the time that it takes water to travel from the water intake to the discharge point. For every influent sample taken an effluent sample must be taken. In addition, influent flow shall be monitored continuously.

2. ***Effluent Monitoring*** – The Discharger shall monitor the effluent in accordance with Section IV.A, B, and Table C-4 (Effluent Monitoring Requirements) of the CAAP General Order for flow, total suspended solids, net total suspended solids, settleable solids, net settleable solids, turbidity, pH, electrical conductivity @25ºC, copper (total recoverable), hardness, formaldehyde, and chlorine.

   The Discharger has been granted intake water credits for copper (total recoverable) and zinc (total recoverable). Therefore, in accordance with Section IV.3 (Effluent Monitoring for Facilities with Intake Water Credits), effluent monitoring is required for flow, copper (total recoverable), and zinc (total recoverable). Effluent copper (total recoverable) shall be

monitored as required in Table C-4, and quarterly effluent grab samples shall be collected for zinc (total recoverable). Samples for copper (total recoverable) and zinc (total recoverable) must be taken simultaneously from the influent and effluent or phased to account for the time that it takes water to travel from the water intake to the discharge point. For every effluent sample taken an influent sample must be taken. In addition, effluent flow shall be monitored continuously.

3. ***Receiving Water Monitoring*** – The Discharger shall monitor the receiving water in accordance with Section VIII. B (receiving water observations) and Table C-6 of the CAAP General Order for dissolved oxygen, temperature, turbidity, pH, electrical conductivity @25ºC, and hardness. The Facility discharges treated effluent at the base of Camanche Dam, therefore no representative upstream sampling is feasible. Upstream receiving water monitoring is not required in this NOA.

4. ***Land Discharge Monitoring Requirements*** – The Discharger shall conduct septic tanks and leachfields inspections annually with annual reports submitted in accordance with Section VI.A.

5. ***Other Monitoring Requirements*** – The Discharger shall submit a Monthly Drug and Chemical Use Report (Section IX.A) and conduct Priority Pollutant Metals Monitoring (Section IX.B) in accordance with the CAAP General Order.

The first self-monitoring report (SMR) required under the CAAP General Order is the June 2012 SMR, which shall be submitted by 1 August 2012. Monitoring reports shall continue to be submitted electronically. Until then, the Discharger shall continue submitting SMRs required by Order R5-2004-0122.

SATISFACTION OF ANTI-BACKSLIDING REQUIREMENTS
The effluent limitations in the CAAP General Order are as least as stringent as the effluent limitations in the previous individual NPDES permit, Order R5-2004-0122, and are consistent with state and federal antibacksliding requirements.

NOTICE OF APPLICABILITY REQUIREMENTS
As of 7 June 2012, the Discharger is authorized to discharge to the Mokelumne River under the terms and conditions of the CAAP General Order. In addition to the requirements contained in the CAAP General Order, the following shall also apply:

1. The discharge from the Facility shall not exceed a daily average flow of 46 mgd during the effective period of the CAAP General Order.

2. The Discharger shall continue to electronically submit Self-Monitoring Reports (SMRs) using the State Water Resources Control Board's California Integrated Water Quality System (CIWQS) Program website (http://www.waterboards.ca.gov/ciwqs/index.html). The CIWQS website will provide directions for SMR submittal in the event there will be service interruption for electronic submittal.

3. The State Water Resources Control Board (State Water Board) has determined that individual or general permits for aquaculture activities defined in 40 CFR 122.25(b) will be subject to the same annual fee, which currently is $1,000 (State Water Board Resolution 2002-0150), but may be subject to change.

4. The CAAP General Order expires on **1 January 2015**, and enrollees will continue to be authorized to discharge until coverage becomes effective under a reissued Order or until Central Valley Water Board staff formally terminates your coverage. Only those CAAP facilities authorized to discharge and who submit a Notice of Intent at least **180** days prior to the expiration date of Order R5-2010-0018-01 will remain authorized to discharge under administratively continued permit conditions.

ENFORCEMENT

Failure to comply with the CAAP General Order and/or this NOA may result in enforcement actions, which could include administrative civil liability. Effluent limitation violations and some late reporting violations are subject to Mandatory Minimum Penalties (MMPs) of $3,000 per violation [California Water Code Sections 13385(h) and (i)]. If you have no discharge during a monitoring period, you must submit a monthly self-monitoring report indicating that no discharge occurred. You must notify the Central Valley Water Board staff within 24 hours of noncompliance or anticipated noncompliance.

COMMUNICATION

All monitoring reports submittals, notification of non-compliance, and questions regarding compliance and enforcement shall be directed to Mohammad Farhad of the Central Valley Water Board's NPDES Compliance and Enforcement Unit. Mr. Farhad can be reached at (916)-464-1181, or mfarhad@waterboards.ca.gov.

Questions regarding the permitting aspects of your CAAP General Order, and written notification for termination of coverage under the Order, shall be directed to Anand Mamidi at (916) 464-4853 or at amamidi@waterboards.ca.gov.

Any person aggrieved by this action of the Central Valley Water Board may petition the State Water Board to review the action in accordance with California Water Code section 13320 and California Code of Regulations, title 23, sections 2050 and following. The State Water Board must receive the petition by 5:00 p.m., 30 days after the date of this NOA, except that if the thirtieth day following the date of this Order falls on a Saturday, Sunday, or state holiday, the petition must be received by the State Water Board by 5:00 p.m. on the next business day. Copies of the law and regulations applicable to filing petitions may be found on the Internet or will be provided upon request. The Internet address is:
http://www.waterboards.ca.gov/public_notices/petitions/water_quality.

Original Signed by Ken Landau for

Pamela C. Creedon
Executive Officer

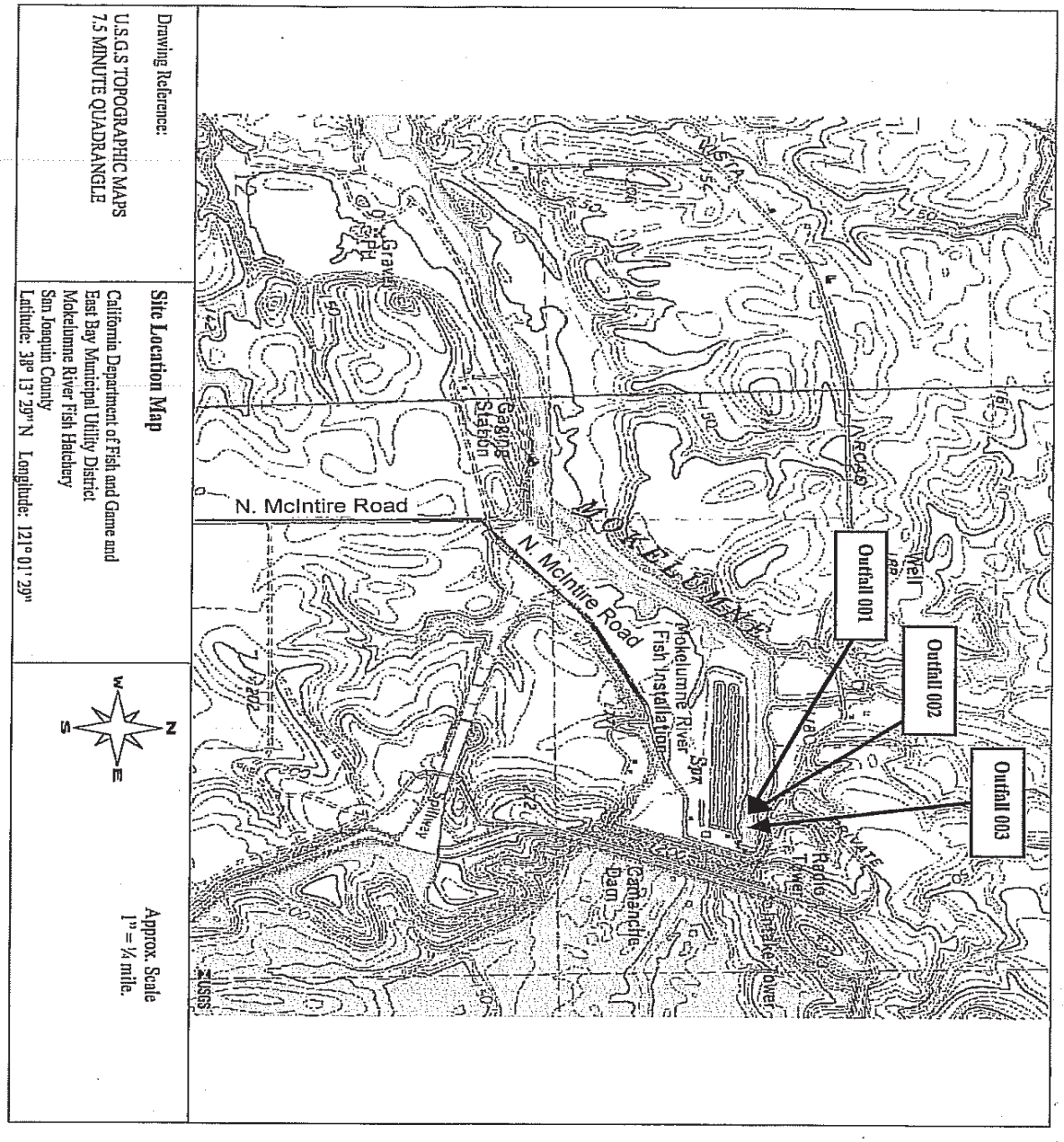
Enclosures (4):
1) Enclosure A – Administrative Information
2) Enclosure B – Location Map
3) Enclosure C – Flow Schematic
4) CAAP General Order R5-2010-0018-01 (Discharger only)

cc: David Smith, U.S. EPA, Region IX, San Francisco
Phil Isorena, State Water Resources Control Board, Sacramento

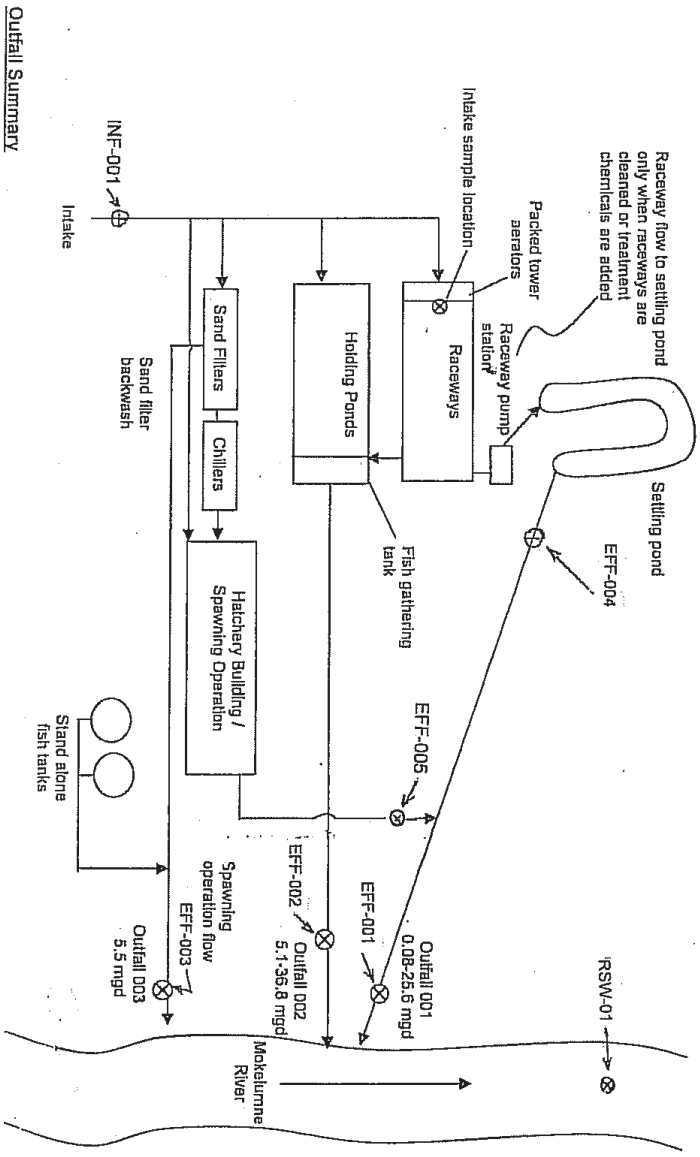
ENCLOSURE A – ADMINISTRATIVE INFORMATION

Name of Facility	Mokelumne River Fish Hatchery
Type of Facility	Cold Water Concentrated Aquatic Animal Production Facility, SIC Code 0921
WDID	5B390800001
General Order NOA Enrollee Number	R5-2010-0018-017
Discharger	California Department of Fish and Game and East Bay Municipal Utility District
Facility Address	25800 N. McIntire Road Clements, CA 95227
Land Owner (Address)	East Bay Municipal Utility District 375 Eleventh St. Oakland, CA 94607 (Contact Person: Jose Setka) (209-365-1467)
Facility Contact, Title and Phone	William Smith (Fish Hatchery Manager II) 209-759-3383
Authorized Person to Sign and Submit Reports	Laird Marshall Jr., American River Fish Manager II, Acting Senior Hatchery Supervisor
Mailing Address	P.O. Box 158 Clements, CA 95227
Billing Address	1 Winemaster Way, Suite 'K'. Lodi, CA 95240
Total Weight Produced (Annual)	175,000 lbs (chinook salmon and steelhead trout)
Major or Minor Facility	Minor
Threat to Water Quality	2
Complexity	B
Facility Permitted Flow	46 million gallons per day (mgd)
Watershed	San Joaquin River Basin
Receiving Water	Mokelumne River
Receiving Water Type	Inland surface water

ENCLOSURE B – LOCATION MAP



ENCLOSURE C – FLOW SCHEMATIC



Outfall Summary

001 - Water used for egg hatching, incubation, fish troughs and the spawning operation (hatchery building wastewaters); settling pond overflow.
002 – Raceway and holding pond/gathering tank flow.
003 – Sand filter back wash and separate fish tank discharge
⊗ - required monitoring location

Note: Effluent flows are estimated, as reported on DMRs

Appendix C

2012 Watershed Owner's Manual

Mokelumne River Watershed Owner's Manual

by

The San Joaquin County Resource Conservation District

Written and edited by

John Brodie

Collaborating Authors

Alyson McCann, Carl DuPoldt, Carolyn Johnson, Bill McGowan,
Barbara Kneen Avery, Elaine Andrews, Karen Filchak, Richard Castelnuovo,
Dean Solomon, Shirley Niemeyer, Michael P. Vogel, and Kathleen Parrott

The *Mokelumne River Watershed Owner's Manual* was adapted with permission from *Home*A*Syst: An Environmental Risk Assessment Guide for the Home* © 1997 by the Regents of the University of Wisconsin System, and with the cooperation of the Northeast Regional Agricultural Engineering Service. The original authors of that publication are listed as collaborating authors here.

Acknowledgments

The impetus for developing this manual was provided by the Lower Mokelumne River Watershed Stewardship Plan (LMRWSP) Steering Committee. The committee was funded by a CALFED grant awarded to the San Joaquin County Resource Conservation District.

Funding to write this manual was provided through the Watershed Coordinator Grant Program, administered by the California Association of Resource Conservation Districts for the California Department of Conservation.

A big thank you to the Board of Directors of the San Joaquin County Resource Conservation District: John B. Meek, Jr. (President), Bill Beatty (Vice President), Joe Furtado, Bill Koster, Ralph Lucchetti, Rogene Reynolds, Richard Rodriquez, John Thoming, Marden Wilber, and the late Julian Bava, for providing encouragement, positive feedback, and the equipment needed to make this project go first class.

The author would like to thank the members of the LMRWSP subcommittee that reviewed this manual as it was developed: Bill Beatty, Brad Kissler, Brad Lange, and Cliff Ohmart.

Thank you Amy Augustine for handling the duties of reporting on the progress of this project to the generous grantors at the California Department of Conservation.

Thank you to Mike Callahan of the San Joaquin County of Public Works for providing the depth to groundwater map included in on page 4.

Thank you to Dave Simpson, Amy Rocha, and Mike Grinstead at the United States Department of Agriculture's Stockton Service Center for their assistance when computer or printer problems surfaced.

Thank you to the original authors for their valued input on the changes made to adapt this for California residents in general, and residents of the Mokelumne River Watershed in particular.

Thank you to Sarah Van Tiem of the National Farm*A*Syst/Home*A*Syst Office and Holly Hyde of the Northeast Regional Agricultural Engineering Service for the way they promptly answered all questions regarding the development and final publication of this manual.

About Home*A*Syst

Home*A*Syst and Farm*A*Syst are national programs supported by the USDA Cooperative State Research Education and Extension Service (CREES), the USDA Natural Resources Conservation Service (NRCS), and the U.S. Environmental Protection Agency (EPA).

For more information, contact: Farm*A*Syst/Home*A*Syst, 303 Hiram Smith Hall Madison, Wisconsin 53706; 608-262-0024 or HOMEASYS@UWEX.EDU

About NRAES

The Northeast Regional Agricultural Engineering Service is a program focused on delivering engineering-related educational materials and training opportunities in support of northeast cooperative extension. All NRAES activities are guided by faculty members from northeast land grant universities. The program is guided by the NRAES Committee, which consists of a representative from each northeast state and the District of Columbia as well as the NRAES director and an administrative liaison appointed by the Northeast Cooperative Extension directors Committee. NRAES is housed in the Department of Agricultural and Biological Engineering at Cornell University.

For more information or for a free publications catalog, contact NRAES, Cooperative Extension 152 Riley-Robb Hall Ithica, New York 14853-5701 (607) – 255-7654 or NRAES@CORNELL.EDU

Initial Home Assessment*

This checklist is a way to quickly scan for potential problem areas in your home. It will help you think about possible risks, and introduce you to many of the topics covered in this handbook. Sections in the handbook cover many other situations and practices not included in this initial assessment. If you answer "yes" to any of these questions, or think there might be risks or areas that need improvement, refer to the appropriate section in the handbook. Skip over any sections that don't apply to your home.

Site Assessment: Protecting Water Quality Around Your Home	YES	NO
Is your soil sandy or gravelly, allowing water to drain through it quickly?		
Is there a potential source of contamination—such as manure, pesticide, or fertilizer storage; a fuel tank; a septic system drain field; or eroding soil—on your property within 100 feet of a well, stream, lake, or wetland?		
Is the water table less than 10 feet below the soil surface?		
Stormwater Management	**YES**	**NO**
Do the downspouts from your roof gutters empty out onto paved surfaces instead of onto grass, mulch, or gravel and thus keep rain from soaking into the ground?		
Are fertilizers, pesticides, or salts stored where floodwaters might reach them?		
Are some parts of your property, particularly slopes, sparsely planted and without mulch, exposing the soil to erosion?		
Drinking Water Well Management	**YES**	**NO**
Has it been more than two years since your water was tested for bacteria and nitrates?		
Do you have a dug or driven well instead of a drilled well?		
Does your well casing extend less than 12 inches above the ground, or is there a low area where rainwater runoff can collect around the well casing?		
Do you have abandoned wells on your property that have not been properly filled and capped?		
Household Wastewater: Septic Systems and Other Treatment Methods	**YES**	**NO**
Has it been more than three years since your septic tank was pumped or inspected?		
Have you noticed any signs of a failing septic system such as slow drains, odors, or soggy ground cover over the drain field?		
Do you have standard toilets and faucets instead of water-conserving fixtures?		

* "Adapted with permission from NRAES-87, Home*A*Syst: An Environmental Risk-Assessment Guide for the Home

Initial Home Assessment *(continued)*

Managing Hazardous Household Products	YES	NO
Do you use products without knowing whether or not they are hazardous?		
Do you ever pour hazardous substances such as antifreeze, oil, paints, stains, polishes, or solvents down a sink drain, down a storm drain, in a ditch, or on the ground?		
Do you burn plastics, batteries, or chemicals that could contaminate air?		
Lead In and Around the Home: Identifying and Managing Its Sources	**YES**	**NO**
Was your home built before 1978 (the year lead was banned from residential paint)?		
Do children under the age of six live in your home?		
Are painted surfaces inside or outside your home peeling, chipping, or chalking?		
Does drinking water flow through lead pipes or contact lead solder?		
Yard and Garden Care	**YES**	**NO**
If you use fertilizer, has it been longer than three years since you had your lawn and garden soil tested for nutrients?		
Do you ever use pesticides without reading the label or following the recommended doses or application instructions?		
Do you have areas of bare soil on your property that are susceptible to erosion?		
Liquid Fuels: Safe Management of Gasoline, Heating Oil, Diesel, and Other Fuels	**YES**	**NO**
Do you store fuel for lawnmowers or other gas-powered equipment in non-approved containers such as glass jars, plastic jugs, or rusted cans?		
Do you store fuel or heating oil in an underground storage tank?		
If you have an aboveground fuel tank, does it lack protection against spills or leaks—for example, a catch basin or concrete spill pad?		
Managing Household Waste: Preventing, Reusing, Recycling, and Composting	**YES**	**NO**
Do you purchase products that you really don't need?		
Do you buy products wrapped in excess packaging?		
Do you throw away yard or food wastes that could be composted?		

A Letter From The Watershed Coordinator

Thank you!

By filling out the initial home assessment and accepting this workbook, you are taking the first steps toward improving your Mokelumne River Watershed. By taking the small steps recommended inside this workbook, you are helping to secure a safer, cleaner source of vital freshwater for your children, grandchildren, and generations to come.

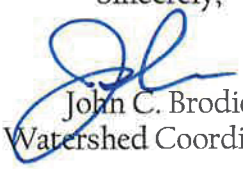
Don't doubt whether the small actions of one person can make a difference. They do! And the steps you take can influence how your neighbors, children, and others treat the watershed as well.

Fresh water is a vital part of our everyday life. We drink it, cook with it, bathe in it, wash our dishes, clothes, and cars with it, nourish our gardens and flowers with it, irrigate our food crops, sustain our pets and livestock with it, and use it for recreational purposes like swimming, fishing, and boating. Without quality fresh water, our quality of life will be diminished.

Whether you own or rent where you live, this guide will show you how to make small changes that can help save you money, and benefit the environment.

The journey of a thousand miles begins with one small step. Thank you for taking that first step.

Sincerely,



John C. Brodie
Watershed Coordinator

Your use of this handbook is strictly voluntary. No one will peek over your shoulder to make sure you follow all the recommendations in this handbook. Only you will know the answers you give on the initial assessment sheet, and only you will know what actions, if any, you take.

You may have been asked if we can contact you in the future about this handbook and the initial assessment you filled out. Copies of the initial assessment form were collected separately from your contact information so no one can determine which sheet belongs to a particular person or family. If you are contacted, it will be to ask general questions about the effectiveness and clarity of this workbook. Only with your permission will we ask any specific questions about any changes you might have made in your home environment or behavior.

We hope that any action you take will be because it is something you believe in, and because you understand how important it is to act now. The steps outlined in this handbook are simple and inexpensive, yet they can have a tremendous impact on the quality of the Mokelumne River. That is true even if you or your household is the only one you know of taking some of these steps.

We hope that you will share these tips and suggestions with your friends and neighbors in the Watershed. Contact the San Joaquin County Resource Conservation District to obtain additional copies of this free handbook, or for more information on the subjects covered within.

Thank you so much for exploring ways to improve the Mokelumne River Watershed. You will reap the benefits of improvements to the river, as will other residents of the community, and the plants and animals that depend on the river for food and shelter.

Using This Handbook

During the course of reading the text, you will come across certain key words that will be printed in *italics*. These words are important to understanding this handbook. Definitions for these words can be found in a glossary at the back of this handbook.

You can complete this handbook in as timely a manner as is best for you. The most important thing is not when you complete this handbook, but that you do complete this handbook.

If you decide to make some of the changes that are recommended, you should establish a ranking system for the changes you want to make, and how soon you plan to implement those changes. For example, we recommend for the sake of your family's health and the health of the environment that you first address any high risks you find, if possible. And, be sure to write down a specific date to complete any of the changes you wish to make.

Involve the Entire Family

Working together on these assessments can be a worthwhile educational experience for everyone. If you value a clean environment and healthy surroundings, then using this handbook to help you make changes will be beneficial in several ways. It might even help you save money, or enhance the resale value for homeowners.

Directions For Completing Assessments

Using a pencil, answer the questions "yes" or "no" or check the appropriate box. You might need to locate your home maintenance records, ask family members or neighbors, or seek assistance or further information.

For answers to general questions or for help in getting more information, feel free to contact the Watershed Coordinator at the San Joaquin County Resource Conservation District at 209-946-6241. Or contact the watershed coordinator via e-mail at: waterinfo@sjcrcd.org

Table Of Contents

Mokelumne River Watershed Owner's Manual

Introduction

The Mokelumne River is a tremendous asset to Lodi and northern San Joaquin County. It is more than a natural resource—it is a community resource. Local recreation areas such as Lodi Lake Park exist solely because of the river. The Mokelumne River is enjoyed by anglers, pleasure boaters, and swimmers. Birdwatchers, hikers, and other nature lovers stroll the river's banks to admire and even study the plant and animal life that the river attracts and sustains.

The Mokelumne also enhances the economic fortune of the area. The recreational activities mentioned above help bring tourism and tourist dollars to the area. The river is a source for irrigation water, which is vital to the health of the area's vineyards, orchards, and farms—the engine that drives the local economy.

It's easy to see that the Mokelumne River contributes significantly to the quality of life in Lodi and northern San Joaquin County. That is why it is so vital to maintain and improve the quality of the water in the river.

Most people know that pollution from human activities can harm the water in rivers like the Mokelumne. Many people believe that most pollution comes from heavy industry or *point sources*. That was once the case, but the U.S. Environmental Protection Agency now says most states are reporting that the largest share of pollution is coming from what are called *non-point* sources.

Non-point source pollution comes from natural and man-made contaminants that are picked up by *runoff*. Runoff water can come from rain, sprinkler systems, or even water from washing a car in your driveway or the street in front of your house. This is where this manual—and you—are most important.

The Mokelumne River Watershed Owner's Manual will show you ways to reduce the amount of runoff generated at your home that enters the Mokelumne River. It will also show you how to reduce the amount of contaminants—natural and man-made—in that runoff.

Protecting groundwater and surface water quality is essential to you, your community, and others "downstream." Making the changes recommended in this handbook will be a real investment in the future for your family and this community. The techniques described in this manual are simple and inexpensive, yet they can have a dramatic impact on the quality of the river that is a centerpiece for our community.

Section 1: Physical Characteristics of Your Homesite[1]

What we do every day in and around our homes can affect water quality. Our use of everyday household products can impair the quality of water in nearby lakes, streams, and wetlands. Our activities and the products we use can also affect water below the ground—the water that supplies the wells we use for drinking water. In this section of the book, we will introduce you to some of the ways to protect these important *groundwater* resources. The city of Lodi and many other cities and towns get the water they distribute to residents from wells. By understanding your behavior at home, and making changes where necessary, you can help protect the water in these wells from contamination.

Common activities like driving your car, cutting your grass, or fertilizing your lawn or garden can affect water quality—even if you do them far away from the river or areas where there are wells for drinking water. By paying careful attention to how you manage activities in and around your home, you can protect your *watershed* and the water you drink. Activities that can impair water quality include the use and storage of fuel for lawn and garden tools, pesticide and fertilizer use and storage, waste disposal methods, and soil erosion. Animal wastes from pets are another threat to water quality, particularly if large amounts from horses, dogs, or other animals are allowed to accumulate on your property. For those who live in rural areas without city water and sewer services, drinking-water well construction and maintenance and septic system maintenance are other important factors.

Soil Type and Water Contamination

Water and other fluids can seep through nearly all soils. Different soils permit water and contaminants to seep through or run off at different rates. For example, fertilizers applied to lawns can flow downward into groundwater or across the land into surface water like the Mokelumne River. The size of soil particles influences which pollutants are able to reach groundwater. Some soils are better at trapping pollutants than others.

Clay soils, which are made up of tiny particles, slow the downward movement of water, and in some cases can block water movement completely. Sandy soils allow for quick water movement, and silty soils occupy the middle range. Soils made up of large particles pose the greatest risk, because water seeps down through them readily without filtering out or decomposing pollutants. The ideal soil is a mix of midsize particles to allow infiltration and tiny particles, like clay or organic matter, to slow water movement and filter pollutants.

Soil type can also affect surface water contamination. Although *runoff* occurs from all soil types, clay soils (the least porous) are more likely to cause surface water runoff. During a storm or flood, or even when watering your lawn, this runoff can wash contaminants from the land's surface into nearby surface waters. Eroding soil is also considered a water pollutant. Bare soil, especially on sloping land, can run off into streams, rivers, lakes, or estuaries.

---

[1] Collaborating author Alyson McCann, University of Rhode Island Cooperative Extension.

The Importance of Soil Depth

The depth of soil influences risks to groundwater. Usually, the deeper the soil, the farther water must seep down before reaching groundwater. Deep soils offer a better chance of filtering or breaking down pollutants before they reach groundwater. Generally, soils that are less than three feet deep present the highest risks for groundwater contamination.

Characteristics of Bedrock

Bedrock depth varies. It can be at the land's surface as in some foothill areas and the mountains, or it can be hundreds of feet down as in most of the Central Valley. The type of bedrock also influences pollution risks. Shale, granite, and other non-porous types of rock make an effective barrier that blocks the downward movement of water and contaminants. Other rocks such as limestone can be very porous, allowing water to move freely into groundwater. When bedrock is split or fractured, water can move through it unpredictably, spreading pollutants rapidly over long distances.

Depth to Water Table

If you dig a hole in your yard, you will eventually reach soil saturated with water. This *water table* marks the boundary where spaces between soil and rock contain air, roots, soil organisms, and some water, and the groundwater. In a wetland, the water table is at or just below the surface. In general, the closer the water table is to the surface, the more the groundwater is vulnerable to contamination.

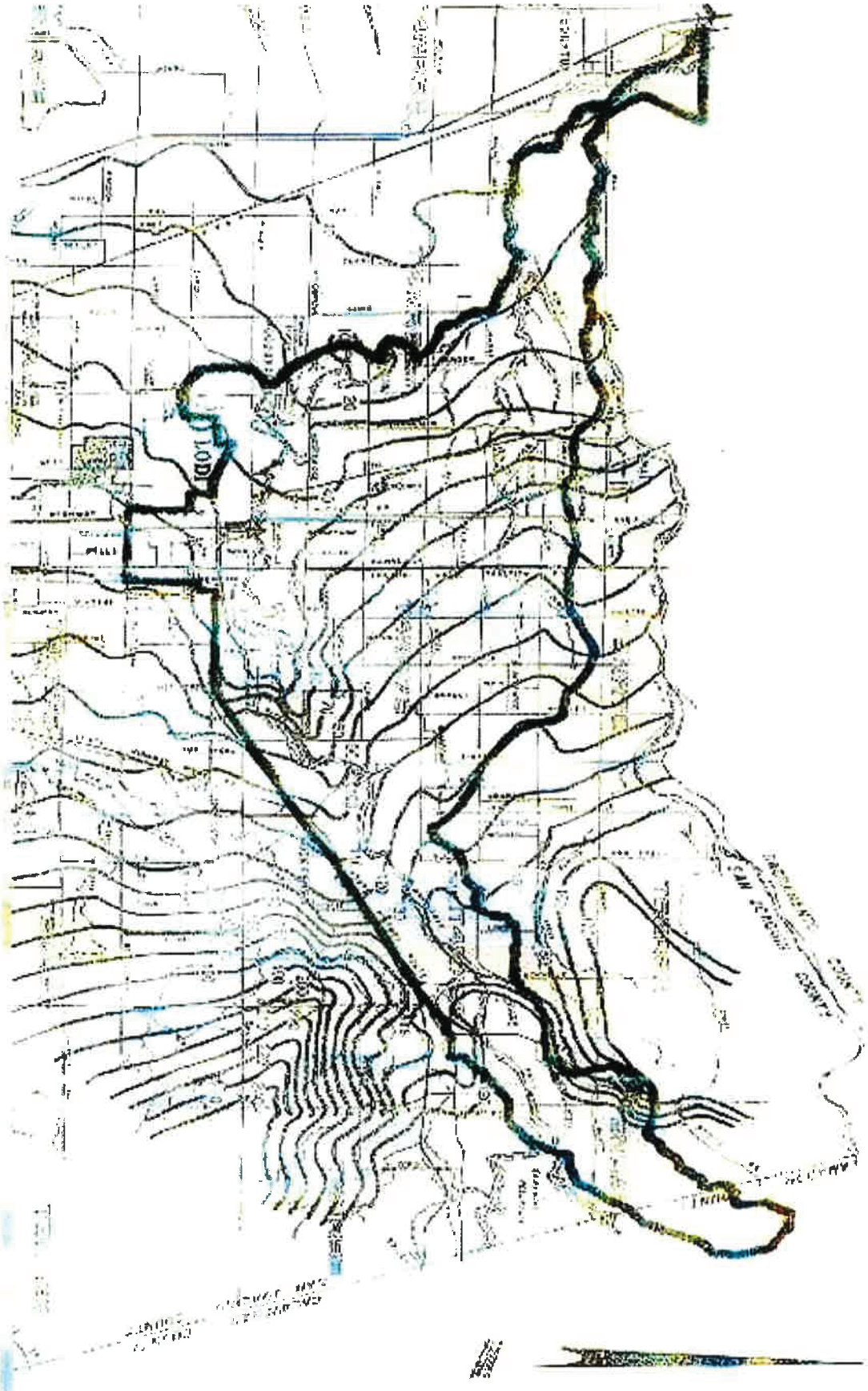
Groundwater and surface water are interconnected. Groundwater generally flows downhill, following the same path as surface water, and eventually discharges into rivers, lakes, springs, wetlands, bays, or estuaries. If you keep impurities out of surface water but don't protect groundwater—or vice versa—contaminated water can occur where you least expect it.

General Characteristics in the Mokelumne River Watershed

Most of the soils in the Mokelumne River Watershed are of the medium risk silt/loam type. Soil depth is generally over 100 feet across San Joaquin County and within the watershed. The U.S. Geological Survey reports the bedrock underlying California's Central Valley is almost impermeable, and flow through bedrock is not significant.

Depth to the water table is generally about 30 feet in the greater Lodi area. However, the depth to water table gets shallower moving west from the city of Lodi towards the Delta. In some of these western areas of the watershed, the depth to the water table is 10 feet or less. Review the enclosed water table map to estimate depth to the water table in the area where you live.

With these considerations in mind, most (if not all) of the Watershed can be considered at medium risks for soil types, low risk for soil depth and bedrock. Determine to the best of your ability the nearness to surface water at your residence using the map on the next page.


10D

Assessment 1-1: Physical Characteristics of Your Homesite*

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Soil type and risks to lakes, rivers, wetlands, or other surface water from runoff	Sand/gravel (large particles)	Silt/loam (mid-size particles)	Clay (very tiny particles)	❑ Low ❑ Medium ❑ High
Soil type and risks to groundwater from infiltration	Clay (very tiny particles)	Silt/loam (mid-size particles)	Sand/gravel (large particles)	❑ Low ❑ Medium ❑ High
Soil depth	Deep (over 12 feet)	Moderately deep (3-12 feet)	Shallow (less than three feet)	❑ Low ❑ Medium ❑ High
Bedrock	Solid, not permeable or fractured	Solid limestone or sandstone	Fractured bedrock-any kind	❑ Low ❑ Medium ❑ High
Depth to water table	Over 20 feet	10-20 feet	Less than 10 feet	❑ Low ❑ Medium ❑ High
Nearness to surface water	Over 100 feet	25-100 feet	Less than 25 feet	❑ Low ❑ Medium ❑ High

Do not depend solely on the physical characteristics of your soil, bedrock, or other site features to protect water quality. You must take informed steps to prevent pollution. Although you can't change your soil type or the depth to bedrock, you can account for these factors when choosing home management practices that do a better job of preventing environmental problems.

Note especially the medium and high risks you identify. Keep them in mind as you complete work on other sections of this handbook.

* Source: NRAES-87, Home*A*Syst: An Environmental Risk Assessment Guide for the Home.

Section 2: Stormwater Management[2]

This section examines potential risks to the environment and your health from stormwater *runoff*, and is intended to help you reduce the pollutants in runoff from around your home, and help you use landscaping and site management to control runoff. Stormwater is water from rain or melting snow that does not soak into the ground. It flows from rooftops, over paved areas and bare soil, and through sloped lawns. As it flows, this runoff collects and transports soil, pet waste, fertilizer, pesticides, oil, grease, litter, and other potential pollutants. Heavy rain isn't needed to send pollutants down *storm drains* and on their way to local streams, rivers, lakes, and wetlands. A garden hose alone can supply enough water to transport these contaminants.

Contrary to popular belief, storm drains do **not** carry stormwater to a wastewater treatment plant. Any pollutants picked up by stormwater in Lodi and much of northern San Joaquin County ends up in the Mokelumne River. Stormwater pollution is treated differently than water pollution from discharge pipes because it comes from many sources. This *non-point source* pollution is carried by stormwater from every street, parking lot, sidewalk, driveway, yard, and garden. The problem can only be solved with everyone's help. But, it doesn't require everyone's participation to make a difference. You can reduce the amount of contaminants that enter the Mokelumne River by reducing the amount of contaminants that get into stormwater from your home.

Stormwater pollution comes from many different sources. Silt, sand, clay particles and other debris that clouds water and degrades habitat for fish and water plants comes from several places in a watershed. These include: construction sites, bare spots in lawns and gardens, wastewater from washing cars and trucks on streets, driveways, or parking lots, and unprotected stream banks. Nutrients such as phosphorus that promote the growth of algae, which crowds out other aquatic life, comes from overused or spilled fertilizers, pet waste, grass clippings and leaves that are left on streets and sidewalks, or leaves that are burned in ditches. Disease organisms such as bacteria and parasites that can make the river and nearby lakes unsafe for swimming and wading get into stormwater from pet waste and garbage. Toxic chemicals and metals that threaten the health of fish and other aquatic life come from cars and trucks (brake and tire wear), motor vehicle exhausts, leaks and spills of oil, gas, and engine coolant, galvanized metal gutters and downspouts, burning leaves, and garbage.

By making yourself aware of the problems, and taking some simple steps to reduce the amount of contaminants that enter stormwater, you can make a difference that will benefit you, your family, the community, and the Mokelumne River. Please fill out the assessment on the next page to help identify stormwater risks on your property. Then, read about ways to reduce contaminants from your home and neighborhood that enter storm water on the following pages. Note all medium and high risks on the action checklist at the end of this section. Using the checklist and information contained in this section, you can formulate an action plan to reduce pollution from your home.

---

[2] Collaborating authors Carl DuPoldt, Natural Resources Conservation Service, and Carolyn Johnson, University of Wisconsin Cooperative Extension.

Assessment 2-1: Reducing Pollutants in Runoff*

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Automotive wastes	Oil drips and fluid spills are cleaned up. Dirty car parts and other vehicle wastes are kept out of reach of stormwater runoff.	Drips and spills are not cleaned up. Car parts and other vehicle wastes are left on unpaved areas outside.	Used oil, engine coolant, and other wastes are dumped down the storm sewer, in a ditch, or on the ground.	❑ Low ❑ Medium ❑ High
Car washing	Cars and trucks are taken to a commercial car wash or spray booth.	Cars, trucks, or other items are washed on a lawn or gravel drive.	Cars, trucks, or other items are washed on a driveway, street, or other paved area.	❑ Low ❑ Medium ❑ High
Storage of pesticides, fertilizers, and other potentially harmful chemicals	Chemicals are stored in waterproof containers in a garage, or shed that is protected from stormwater.	Chemicals are stored in waterproof containers but within reach of stormwater.	Chemicals are stored in non-waterproof containers outdoors or within reach of stormwater.	❑ Low ❑ Medium ❑ High
Handling and use of pesticides, fertilizers, and outdoor chemicals	Spills are cleaned up immediately, particularly on paved surfaces. Minimum amounts of chemicals are applied according to label directions. Applications are delayed to avoid rain.	Applications are not delayed to avoid rain.	Spills are not cleaned up. Products are used in higher amounts than what is recommended on the label.	❑ Low ❑ Medium ❑ High
Pet and animal wastes	Animal and pet wastes are flushed down the toilet or buried away from gardens, wells ditches, or areas where children play; or are wrapped and placed in the garbage for disposal.	Animal wastes are left to decompose on grass or soil. Wastes are scattered over a wide area.	Animal wastes are left on paved surfaces, concentrated in pen or yard areas, or dumped down a storm drain or in a ditch	❑ Low ❑ Medium ❑ High
Grass clippings, leaves, and other yard waste	Grass clippings, leaves, and other yard wastes are swept off paved surfaces and onto lawns away from water flow routes. Leaves and other yard wastes are composted.	Leaves and other yard wastes are piled on the lawn next to the street for collection.	Grass clippings, leaves, and other yard wastes are left on driveways, streets, and other paved areas to be carried off by stormwater. Yard waste is burned on-site.	❑ Low ❑ Medium ❑ High

* Source: NRAES-87, Home*A*Syst: An Environmental Risk Assessment Guide for the Home.

Reducing Pollutants in Runoff

Oil stains on your driveway and outdoor spills of engine coolant, fuel, or other automotive fluids are easily carried away by runoff. An oily sheen on runoff from your driveway is a sure signal to be more careful. Pans, carpet scraps, and matting can catch drips while routine care can prevent cars from leaking, and help identify leaks. If you change your own oil, avoid spills and always collect waste oil for recycling. Oily automotive parts should be stored where rain and runoff cannot reach them. Never dump used oil, engine coolant, or gasoline down a storm drain, in a ditch, or on the ground. They will end up in the river or can pollute your drinking water.

Washing your car in the driveway creates runoff without the help of a rainstorm—your hose provides the water. The dirty, soapy runoff drains directly into storm sewers, picking up oil and other pollutants as it goes. Try washing your car on the lawn or, better yet, take it to a commercial car wash or spray booth that sends its dirty water to a wastewater treatment plant.

Household Product Storage

Most people store lawn and garden products like weed killers, insecticides, and fertilizers. If stormwater or floodwater reaches these products, it can transport them into storm drains, surface water, or possibly wells. A variety of other products including pool chemicals and stored fuel for lawnmowers can also cause trouble if they are washed away. It is vital to keep these products in waterproof containers and store them high and out of the path of runoff or floods. One way to avoid storage problems is to buy only what you need for a particular task and use up the product.

But safe storage is only one part in preventing contaminated runoff. When mixing fuels for leaf blowers or chainsaws, or mixing chemicals like fertilizers, try to do it within a washtub so spills will be contained. If chemicals are spilled, act quickly to contain and clean up the spill, particularly on paved surfaces. See Section 6, Yard and Garden Care for more information on the proper use and handling of yard and garden products.

Pet and Animal Wastes

Droppings from dogs, cats, and other commonly kept animals like exotic birds, horses, rabbits, and others can contain substances that promote the growth of algae if they enter rivers and lakes. These droppings can also be a source for disease. The risk of stormwater contamination rises if pet wastes are left on sidewalks, streets, or driveways where runoff can carry them into storm drains. Droppings that are not mixed with litter or other materials should be flushed down the toilet. In some cases, droppings can be buried or wrapped and put in the garbage for disposal.

Yard and Garden Wastes

Rain or sprinklers can wash grass clippings and other wastes from sidewalks, driveways, or roads into storm drains. Leaves and other plant debris are found naturally in streams and lakes, but excessive amounts of plant matter can build up, especially in areas with many homes. It is best to sweep clippings back onto the grass and compost leaves and other garden wastes on your property. This recycles nutrients. Burning yard waste is against the law within the city limits of Lodi, and is also a fire hazard during dry months—especially in northeastern sections of the watershed dominated by rangeland.

Assessment 2-2: Landscaping and Site Management to Control Runoff*

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Bare soil in lawns and gardens	Bare spots in the lawn are promptly seeded and topped with a layer of straw or mulch. Bare soil in gardens is covered with mulch.	Grass or other ground cover is spotty, particularly on slopes.	Spots in the lawn or garden are left without mulch or vegetation for long periods.	❑ Low ❑ Medium ❑ High
Bare soil during construction	Bare soil is seeded and mulched as soon as possible (before construction is completed). Sediment barriers are used until grass covers soil.	Soil is left bare until construction is completed. Sediment barriers are installed and maintained to detain muddy runoff until grass covers soil.	Soil is left bare and no sediment barriers are used.	❑ Low ❑ Medium ❑ High
Paved surfaces	Paved surfaces are minimized. Alternatives such as wood chips or paving blocks are used for walkways, patios, and other areas.	Some small areas are paved for patios or basketball.	Paved surfaces are used extensively.	❑ Low ❑ Medium ❑ High
Stormwater diversion	Yard is sloped away from the foundation. Downspouts direct roof drainage away from the house.	No special water diversion methods are installed. Stormwater does not flow near the foundation.	No water diversion methods are tried. Stormwater flows near the foundation.	❑ Low ❑ Medium ❑ High
Roof drainage	Downspouts and drip lines direct roof drainage onto a lawn or garden where water soaks into the ground.	Some downspouts and drip lines discharge water onto paved surfaces or grassy areas where water runs off.	Most or all drip lines or downspouts discharge onto paved surfaces, or are connected direct to storm drains.	❑ Low ❑ Medium ❑ High
Landscaping and buffer strips.	Yard is landscaped to slow the flow of stormwater and provide areas where water soaks into the ground. Unmowed buffer strips of thick vegetation are left along streams or lakeshores.	No areas are land-scaped to encourage water to soak in. Yard is relatively flat and little runoff occurs. Mowed grass or spotty vegetation exists adjacent to a stream or lake.	There is no landscaping to slow the flow of storm-water, especially on hilly, erodable properties. Stream banks or lakeshores are eroding.	❑ Low ❑ Medium ❑ High

* Adapted with permission from NRAES-87, Home*A*Syst: An Environmental Risk Assessment Guide for the Home.

Landscaping and Property Management to Control Runoff

Areas of bare soil are often found in vegetable and flower gardens, on newly seeded lawns, and around construction projects. Rainwater can remove large amounts of soil and carry it to rivers, lakes, and wetlands. Planting grass or other *ground cover* is the best way to stop erosion. It is best to use native plants and grasses in order to reduce the need for expensive fertilizers and the watering that will be required for non-native plants not adapted to the long, dry summers of the Central Valley. Putting straw or chip mulch on gardens or newly seeded areas will slow erosion.

Hard Surfaces

Concrete and asphalt roads, driveways, and walkways prevent rain from soaking into the ground. When you have a choice, consider alternative materials such as gravel or wood chips for walkways. Avoid paving areas for patios, or consider a deck as an alternative. Where you need a more solid surface, consider using interlocking cement blocks or rubber mats that allow spaces for rainwater to seep into the ground. If you must pave or pour concrete, keep the paved area as small as possible.

The roof of your house is similar to a paved area in that it sheds water. If downspouts from roof gutters empty onto grassy areas, the water will have a chance to soak into the ground, and there is less water to carry contaminants into storm drains. Wherever possible, aim downspouts away from foundations and paved surfaces. For roofs without gutters, plant grass or spread mulch or gravel under the drip line to prevent soil erosion and increase the ground's ability to absorb water running off of the roof.

Preventing and Reducing Runoff

Keeping water from leaving your property, or at least slowing its flow as much as possible, is an essential part of stormwater management. In residential neighborhoods, many lawns are sloped to encourage water to runoff onto streets. To slow the flow of stormwater or sprinkler runoff, landscape low areas with shrubs and flowers to encourage water to soak into the ground. It is best to use native plants and flowers.[3] Since native plants are adapted to the soil types and local climate, they won't require fertilizers or watering. Plus, they'll add beauty to your property.

If you have a large lot, consider "naturalizing" areas with prairie, woodland, or wetland plants. If your property adjoins the river, a stream, or lake, one of the best ways to slow and filter runoff is to leave a buffer strip of thick vegetation along the waterfront. This vegetation will also help provide homes for birds, beneficial insects such as butterflies, and other wildlife.

[3] Contact the San Joaquin County Resource Conservation District or the California Native Plant Society for advice on choosing native plants and flowers for areas around your home. See page 65 for contact information.

Action Checklist*

Stormwater Management

Write all high and medium risks below.	What can you do to reduce the risk?	Set a target date for action.
Sample: Pet wastes left in areas where runoff occurs.	Collect waste in bags for disposal in trash (not in recycling).	One week from today: September 16

* Source NRAES-87, Home*A*Syst: An Environmental Risk Assessment Guide for the Home

Section 3: Drinking Water Well Management[4]

Not everyone in the Mokelumne River Watershed gets drinking water from a well on personal property. But, drinking water for nearly everyone in the watershed comes from a well. For example, the drinking water distributed to residents by the city of Lodi is pumped from wells. This section of the handbook might not apply to you as someone who uses a private well for drinking water. But it is important to understand that your actions do affect the groundwater sources that many people in this watershed rely on for drinking water. It is also possible that you might have an old well on your property.

This section of the handbook should also help private well owners and users to better understand the condition of wells, and how they should be cared for. Assessment tables in this section help to identify situations and practices that are safe. These tables also identify situations and practices that require prompt attention.

The first table covers how a well's location in relation to other features on or near your property will determine some pollution risks. The nearness of the well to sources of pollution and the direction of groundwater flow between pollution sources and your well are the primary concerns.

The second table focuses on well construction, maintenance, water testing, and unused wells. Old or poorly designed wells increase the risk of groundwater contamination by allowing rain to reach the *water table* without being filtered through soil. Good maintenance means keeping the well area clean and accessible, keeping pollutants as far away as possible, and having a qualified well-driller or pump installer check the well periodically, or when problems are suspected. Testing the water helps you monitor water quality, and identify potential health risks to you and your family. And abandoned wells, if improperly sealed, can provide contaminants with a direct route to groundwater.

Fill out the assessment tables to the best of your ability. Then, read about ways to protect wells and groundwater from contamination. Note all medium and high risks on the checklist at the end of this section. Using the checklist and information contained in this section, you can formulate an action plan to protect drinking wells and reduce pollution from your home.

[4] Collaborating author Bill McGowan, University of Delaware Cooperative Extension.

Assessment 3-1: Well Location*

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Position of well in relation to pollution sources	Well is uphill from all pollution sources. Surface water doesn't reach well or is diverted.	Well is level with or uphill from most pollution sources. Some surface water runoff may reach well.	Well is downhill from pollution sources or in a pit or depression. Surface water runoff reaches well.	❑ Low ❑ Medium ❑ High
Separation distances between well and pollution sources	Distances from potential pollution sources meet or exceed all state minimum requirements.	Some but not all distances from potential pollution sources meet state minimum requirements.	Distances from most or all potential pollution sources do not meet state minimum requirements.	❑ Low ❑ Medium ❑ High
Soil type	Soil is fine-textured like clay loams or silty clay.	Soil is medium textured like silt or loam.	Soil is coarse-textured like sand, sandy loam, or gravel.	❑ Low ❑ Medium ❑ High
Subsurface conditions	The water table or fractured bedrock is deeper than 20 feet.	The water table or fractured bedrock is about 20 feet.	The water table or fractured bedrock is shallower than 20 feet.	❑ Low ❑ Medium ❑ High

* Adapted with permission from NRAES-87, Home*A*Syst: An Environmental Risk-Assessment Guide for the Home

Well Location

When possible, locate a well where *surface water* (for example, stormwater runoff) drains away from it. If a well is downhill from a leaking fuel storage tank, septic system, or over-fertilized farm field, it runs a greater risk of becoming contaminated than a well uphill from these pollution sources. In areas where the water table is near the surface (western areas of the watershed) groundwater often flows in the same direction as surface water. But, the slope of the surface does not always indicate the direction of groundwater flow.

Soil and Bedrock Type, Distance to the Water Table

Pollution risks are greater when the water table is near the surface because contaminants have a short distance to travel. Groundwater contamination is more likely if soils are shallow (not the case in the Mokelumne River Watershed) or if they are highly porous (sandy or gravelly). For more information on soil and bedrock characteristics, and the water table in San Joaquin County, see Section 1 Physical Characteristics of Your Homesite on page *2*.

New Wells

It is best to provide as much separation as possible between your well and potential pollution sources. These potential pollution sources include underground fuel storage tanks, septic systems, and abandoned wells. Separating your well from a pollution source might reduce the chance of contamination, but it does not guarantee that the well will be safe.

Fill out the assessment on the next page to rate your risks for well construction, maintenance, water testing, and unused wells. Then read the text on the following page to find out ways to reduce your risks. Some choices might not correspond to your exact situation, so choose the response that best fits. Be sure to record any medium or high risks on the action checklist on the last page of this section.

Assessment 3-2: Well Construction, Maintenance, and Testing*

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Well age	Well is less than 20 years old.	Well is 20-50 years old.	Well is more than 50 years old.	❑ Low ❑ Medium ❑ High
Well type	Drilled well.	Driven point (sand point) well.	Dug well.	❑ Low ❑ Medium ❑ High
Casing height above land surface	Casing is 12 or more inches above the surface. If the area floods, casing is 1-2 feet above the highest recorded flood level.	Casing is at the surface or up to 12 inches above the surface.	Casing is below the surface or in a pit or basement.	❑ Low ❑ Medium ❑ High
Condition of casing and well cap (seal)	No holes or cracks are visible. Cap is tightly attached. A screened vent faces the ground.	No holes or cracks are visible. Cap is loose.	Holes or cracks are visible. Cap is loose or missing. Running water can be heard or seen.	❑ Low ❑ Medium ❑ High
Casing depth relative to land surface	Casing extends 50 or more feet below the land surface.	Casing extends 20-50 feet below the land surface.	Casing extends less than 20 feet below the land surface.	❑ Low ❑ Medium ❑ High
Backflow protection	Measures are taken to prevent backflow and, where necessary, anti-backflow devices are installed.	Measures are sometimes taken to prevent backflow. No anti-backflow devices are installed.	No measures are taken to prevent backflow. No anti-backflow devices are installed.	❑ Low ❑ Medium ❑ High
Well inspection and "tune-up"	Well was inspected within the last ten years.	Well was inspected 10-20 years ago.	Well was inspected over 20 years ago, or don't know when well was last inspected.	❑ Low ❑ Medium ❑ High
Water Testing	Consistent, good water quality. Tests meet standards for bacteria, nitrate, and other contaminants.	Some tests do not meet standards or tests approach standards.	Water is not tested. Water is discolored after a rainstorm. There are noticeable changes in color, odor, and taste.	❑ Low ❑ Medium ❑ High
Unused wells on your property or in your area	There are no unused wells, or there are unused wells that are properly sealed.	There are unused wells that are not sealed but are capped and isolated from contaminants.	There are unused, unsealed wells that are in poor condition, near pollution sources, and/or uncapped.	❑ Low ❑ Medium ❑ High

* Adapted with permission from NRAES-87, Home*A*Syst: An Environmental Risk-Assessment Guide for the Home.

Well Construction, Maintenance, and Unused Wells

Most residential wells today are drilled wells, and are usually four to eight inches in diameter. Well drillers commonly install a steel or plastic pipe casing to prevent the well hole from collapsing during drilling (residential wells can be 200 feet deep or more). The space between the casing and the sides of the hole is a direct channel for surface water and pollutants to reach the water table. Drillers usually fill the space with cement or clay.

The depth of casing required for your well depends on the depth to groundwater and the nature of the soils and bedrock below, but a minimum 20 feet of casing should be used for all wells. The casing should extend at least 12 inches above the surface of the ground. If there are floods where you live, the casing should extend up to two feet above the highest recorded flood level for the property. The ground around the casing should slope away from the wellhead in all directions to prevent water from pooling around the casing. The well cap should be firmly attached to the casing, with a vent that allows only air to enter. If your well has a vent, be sure it faces the ground, is tightly connected to the well cap, and is properly screened to keep insects out.

Well Inspection

You should visually inspect the condition of your well casing for holes or cracks. Examine the part that extends up out of the ground. Remove the cap and inspect the inside casing using a flashlight. If you can move the casing around by pushing it, there could be a problem with the well casing's ability to keep out contaminants. Well equipment doesn't last forever and should be inspected by a qualified well driller or pump installer every 10-15 years. Keep well construction details along with dates and results of maintenance visits for the well and pump. These records will help you and future owners follow a good maintenance schedule.

Abandoned, Unused Wells

Some properties have wells that are no longer used. Older homes can have an abandoned shallow well that was installed when the house was first built. If not properly filled and sealed, these wells can provide a direct channel for pollutants in runoff to reach groundwater. A licensed, registered well driller or pump installer should be hired to close these wells. Effective well plugging calls for experience with well construction materials and methods. Money spent sealing a well will be a bargain compared to the potential costs of clean up or the loss of property value if contamination occurs.

Water Testing

If you have a well, your water should be tested once each year. Water should be tested more often if: someone in your household is pregnant or nursing, there are unexplained illnesses in the family, neighbors find a dangerous contaminant in their water, you note a change in water taste, odor, color, or clarity, there is a spill of chemicals or fuel into or near your well. The four most common indicators of trouble in well water are: *bacteria, nitrates, pH*, and *total dissolved solids (TDS)*. You can seek further advice on testing from your local Cooperative Extension Office or health department.

Action Checklist*

Drinking Water Well Management

Write all high and medium risks below.	What can you do to reduce the risk?	Set a target date for action.
Sample: Water hasn't been tested for 10 years. Smells different than it used to.	Have sample tested by county department of public health services.	One week from today: October 11

* Source NRAES-87, Home*A*Syst: An Environmental Risk Assessment Guide for the Home

Section 4: Household Wastewater[5]

This section provides general guidelines for safe management of household wastewater. Wastewater treatment systems help protect your health and the environment. Household wastewater from sinks, toilets, washing machines, and showers carries dirt, soda, food, grease, and bodily wastes out of your house. This wastewater also carries disease-causing bacteria, viruses, and other *pathogens* as well as nitrogen, phosphorous, and organic wastes (*nutrients*). These nutrients promote weed growth and lower oxygen levels in surface water and thus affect fishing and recreational use of rivers and lakes.

Wastewater treatment systems are designed to remove or break down these contaminants before they enter groundwater, or nearby lakes, streams, or wetlands. Most people in the city of Lodi and communities like Woodbridge are connected to community sewer systems. Houses in these communities are connected to *sanitary sewer* systems. The sanitary sewage system transports household wastewater to a sewage treatment plant. This wastewater is filtered, treated, and disinfected before it is discharged into a stream or river.

This section of the handbook is generally more for residents who have septic systems buried in their yards. But even if wastewater is sent to a sewage treatment plant, there are still ways you can reduce the impact your wastewater has on your community and the environment. Conserving water and being careful about what you put down the drain are easy ways to help.

Wastewater treatment is often out-of-sight and out-of-mind until problems occur. Knowing the basics about your household system and taking simple precautions can prevent problems. It's a wise investment to keep your system working well because replacing a failed system can cost thousands of dollars.

A typical septic system consists of a septic tank, distribution system, and drainfield. These drainfields are sometimes known by other names such as: soil absorption field, leach field, or tile field. There are also some alternative household wastewater treatment options. This handbook will deal with the most common septic system. For information on alternative systems, contact your local Cooperative Extension agent, or the San Joaquin County Health Department.

Fill out the assessment tables to the best of your ability. Then, read about ways to manage and reduce household wastewater. Note all medium and high risks on the checklist at the end of this section. Using the checklist and information contained in this section, you can formulate an action plan to pinpoint and minimize risks before they become expensive health or environmental problems.

[5] Collaborating author Barbara Kneen Avery, College of Human Ecology, Cornell Cooperative Extension.

Assessment 4-1: Septic System Design and Location*

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Capacity of System	Tank is designed to handle more wastewater than required, based on the size of the home.	Capacity just meets load requirements, but I watch out for factors indicating system overload. Water conservation measures are taken.	Bathrooms, bedrooms, or water using appliances are added without reexamining the capacity of the wastewater system.	❑ Low ❑ Medium ❑ High
Separation distance	Drainfield is at least 100 feet from any well or surface water.	Drainfield is between 50 and 100 feet from a well or surface water.	Drainfield is less than 50 feet from a well or surface water.	❑ Low ❑ Medium ❑ High
Age of system or holding tank YEAR INSTALLED: _____	System is 5 years old or less	System is between 6 and 20 years old.	System is more than 20 years old.	❑ Low ❑ Medium ❑ High
Effluent filter	An effluent filter is installed and cleaned regularly.	An effluent filter is installed but not cleaned often enough.	There is no effluent filter installed on the septic tank outlet.	❑ Low ❑ Medium ❑ High
Safety devices	An alarm on the pumping chamber or holding tank indicates that the tank is full or power has been cut off to the pump.		There is no alarm to indicate tank overflow or that power has been cut off to the pump.	❑ Low ❑ Medium ❑ High
Backflow protection	A backflow valve is installed to prevent backup during floods.		No backflow valve is installed to prevent backup during floods.	❑ Low ❑ High

* Source: NRAES-87, Home*A*Syst: An Environmental Risk-Assessment Guide for the Home

Septic System Design and Location

Your household septic system must be designed for the maximum occupancy of your home. Both the septic tank and drainfield should have the capacity to treat all the wastewater generated in your house, even at times of peak use. In San Joaquin County, a three-bedroom home requires a septic tank with a capacity of 1,200 gallons. For a four-bedroom home, the tank capacity requirement is 1,600 gallons. For each additional bedroom, increase the tank capacity by 400 gallons.

The septic tank should be large enough to hold two days worth of wastewater (two days is long enough to allow solids to settle out by gravity). Household water use in excess of the system's design capacity can lead to incomplete wastewater treatment or system failure. More frequent pumping of your septic tank or conserving water can extend the life of the system. Adding a bathroom or a water-using appliance (such as a Jacuzzi, dishwasher, or water softener) might require an expansion of your septic system.

Septic Systems Performance and Safeguards

If you have a septic system, then it is likely your household water is supplied by a well on your property. To prevent contamination of water supplies, San Joaquin County requires leach lines be at least 100 feet from any drinking water well or streambed, and 200 feet from a lake. (If your septic system was installed prior to 1972, the separation required in San Joaquin County is 50 feet from a drinking water well or flowing water.) The greater the separation, the less chance there is of contaminating the water supply. It is better if your septic system is downhill from a well.

Septic systems should last 15 to 40 years or more, depending on how they were designed and how well they are maintained. If your septic tank is made of steel, it will rust and need replacement. The older a system is, the more likely that it does not meet the latest standards.

Solids that do not settle out in the tank can be carried out of the tank with effluent and clog the drainfield. This will lead to premature system failure. By placing an effluent filter on the outlet, you can capture small particles and prevent them from clogging the drainfield. Bacteria that slowly digest wastes in the tank produce gas bubbles. A gas baffle near the outlet deflects the bubbles and the disturbed sludge away from the outlet.

An alarm should be installed on holding tanks or pumping chambers to warn you if the tank is nearly full. If your system depends on a pump (instead of gravity), you should have a backup power supply available in addition to adequate storage capacity in the tank. In flood hazard areas, backflow valves should be installed on the main distribution line to prevent waste from flooding back into the tank and your home.

Assessment 4-2: On-site System Maintenance*

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Maps and records	I keep a map and good records of repairs and maintenance.	The location of my tank and date of last pumping are known but not recorded.	The location of my system is unknown. I do not keep a record of pumping and repairs.	❑ Low ❑ Medium ❑ High
Tank pumping (including holding tanks)	The septic tank is pumped on a regular basis as determined by an annual inspection, or about every three to five years. The holding tank is pumped as needed.	The septic tank is pumped, but not regularly.	The septic tank is not pumped. The holding tank overflows or leaks between pumpings.	❑ Low ❑ Medium ❑ High
Condition of tank and baffles	The tank and baffles are inspected for cracks; repairs are made promptly.		The condition of the tank and baffles is unknown.	❑ Low ❑ High
Drainfield protection	Vehicles and other heavy objects or activities are kept from the drainfield area.	Occasionally, the drainfield is compacted by heavy objects or activities.	Vehicles, livestock, heavy objects, or other disturbances are permitted in the drainfield area.	❑ Low ❑ Medium ❑ High
Diverting surface water	All surface runoff is diverted away from the drainfield.	Some surface water flows into the drainfield area.	Runoff from land, rooftops, driveways, etc. flows into the drainfield.	❑ Low ❑ Medium ❑ High
Plantings over the drainfield	Grass or other shallow-rooted plantings are over the drainfield.		Trees and shrubs are growing on or near the drainfield.	❑ Low ❑ High
Signs of trouble	Household drains flow freely. There are no sewage odors inside or outside. Soil over the drainfield is firm and dry. Well water tests negative for coliform bacteria.	Household drains run slowly. Soil over the drainfield is sometimes wet.	Household drains back up. Sewage odors can be noticed in the house or yard. Soil is wet or spongy in the drainfield area. Well water tests positive for coliform bacteria.	❑ Low ❑ Medium ❑ High

* Source: NRAES-87, Home*A*Syst: An Environmental risk-Assessment Guide for the Home

On-Site System Maintenance

Keeping good records each time your septic system is pumped, inspected, or repaired will help you make cost-effective maintenance decisions. This information is also valuable if you sell or transfer your property.

If you have not worked with your septic system before, you might need to contact the previous homeowner or a pumper's records for information that could include the location of your system and most recent pumping, or other maintenance performed. If you secured a county permit prior to installing your septic system, the Environmental Health Division in the San Joaquin County Public Health Office will have a map showing the location of the septic system on your property.

Regular pumping is the most important action you can take to maintain your system. As more solids accumulate in the tank, particles are more likely to flow out of the tank and into the drainfield. The cost of pumping the septic tank (typically less than $300) is far less than the expense of replacing a drainfield clogged by escaping solids (could approach $10,000). The best way to determine when to pump your tank is to have it inspected annually.

Pumping as needed based on the results of periodic inspections will minimize your maintenance costs and maximize the system's longevity. Inspection can also identify problems before they cause a backup or a drainfield failure. Generally, your tank should only need to be pumped every three to five years. But the need for pumping will vary based on the size of your septic tank, the amount of wastewater generated by your household, the amount of solids carried in the wastewater, and the age of your septic system.

After pumping, the tank and other components should be inspected by a professional for cracks, and the condition of the baffles. Leaks should be repaired promptly. **Never** crawl inside or lean into a septic tank without proper ventilation and safety precautions as the gases inside septic tanks can be deadly!

It is also important to protect your drainfield or leach lines. A septic system depends on good soil conditions for treatment and disposal of effluent. Water must be able to percolate through the soil at a reasonable rate. To prevent soil compaction, don't drive vehicles on the drainfield. Do not pave, build, pile heavy objects, or place a swimming pool over a drainfield. These activities compact the soil, and microbes in the soil need oxygen to help them digest wastes.

Signs of Trouble

Some signs that your system might be failing or in need of maintenance include:

- Foul odors in your home or yard.
- Slow or backed up drains could be caused by a clog in the house pipes, septic tank, drainfield, or roof vent for your household plumbing.
- Wet, spongy ground or lush plant growth could appear if there is a leaking tank or failing drainfield.

- Repeated intestinal illnesses in your family could occur if your drinking water supply is contaminated by poorly treated wastewater. Have your drinking water tested annually for coliform bacteria and nitrates.
- Algal blooms and excessive weed growth in nearby ponds or lakes can be caused by phosphorous leaching from septic systems.

Respond quickly to any problems you observe. It could be necessary to expand or modify your system to avoid further problems. Try to base your decision on what is best for the health of you and your family, and for the environment. Keep in mind that what seems like the least expensive option could be very costly in the long run.

Assessment 4-3: Septic or Sewage System Inputs*

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Solid wastes	There is no garbage grinder (dispose-all) in the kitchen. No grease or coffee grounds are put down the drain. Only toilet tissue is put in the toilet.	There is moderate use of a garbage grinder, and some solids are disposed of down the drain.	There is heavy use of a garbage grinder, and many solids are disposed of down the drain. Many paper products or plastics are flushed down the toilet.	❑ Low ❑ Medium ❑ High
Cleaners, solvents, and other chemicals (also applies to holding tanks)	There is careful use of household chemicals (paints, cleaning products). No solvents, fuels, or other hazardous chemicals are poured down the drain.	There is occasional disposal of hazardous household chemicals in the wastewater system.	There is heavy use of strong cleaning products that end up in wastewater. Hazardous chemicals are disposed of in the wastewater system.	❑ Low ❑ Medium ❑ High
Water conser-vation	Only water conserving fixtures and practices are used. Drips and leaks are fixed immediately.	Some water conserving steps are taken (such as using low-flow shower heads or fully loading washing machines and dishwashers).	Standard high-volume bathroom fixtures are used (toilets, showers). No effort is made to conserve water. Leaks are not repaired.	❑ Low ❑ Medium ❑ High
Water usage	Laundry and other major water uses are spread out over the week.		Several water using appliances and fixtures are in use in a short period of time.	❑ Low ❑ Medium

* Source: NRAES-87, Home*A*Syst: An Environmental Risk-Assessment Guide for the Home

Septic or Sewage System Inputs

Don't treat the wastewater treatment system like a trash can or compost pile. Tissues, disposable diapers, baby wipes, sanitary napkins, tampons, condoms, cigarette butts, and other solid waste should be disposed of in the trash and not down the toilet. Since they do no break down easily, they can cause septic tanks or the settling tanks in sewage treatment plants to fill up faster.

Using the disposal or grinder in the kitchen sink can also add to the load on the system. Excess grease, fats, and coffee grounds can clog your septic system. Instead, consider composting food waste as an alternative. Your local cooperative extension office can provide you with information about composting.

Household Chemicals

Wastewater treatment systems were not designed to neutralize the wide variety of common household chemicals. Paints, solvents, acids, drain cleaners, oils, and pesticides can pass untreated through septic systems and contaminate the groundwater. High concentrations or large volumes of *water-soluble* cleaners or bleach can harm septic tank microbes. Section 5, Managing Household Hazardous Products (page 27) of this handbook gives you information about the proper disposal of household chemicals.

Avoid using chemical products advertised to improve septic system operation. They cannot replace routine pumping and could even be harmful. Buying and adding yeasts, bacteria, or enzymes is unnecessary as there should already be plenty of the right microbes digesting wastes in your system. Additives containing solvents to unclog your system can kill these microbes, and might contaminate your drinking water supply.

Water Conservation and Wastewater

It is estimated that the average American uses about 200 gallons of water per day. This includes water for drinking, bathing, washing clothes and dishes, and brushing your teeth. Reducing the flow of wastewater through the septic tank allows more time for solids to settle out and less chance of solid particles being carried into the drainfield or clogging the system. Less water in the drainfield means better aeration for microbes at work in the system. Here are some steps you can take to reduce the amount of water you use.

1. Take shorter showers, and turn the water off when washing and shampooing hair.
2. Repair leaky faucets, fixtures, and toilets immediately.
3. Run water only when necessary; for example, turn off the water while brushing your teeth or shaving.
4. Only run dishwashers and clothes washers when full.
5. Scrape but do not pre-rinse dishes before loading them into the dishwasher.
6. Adjust water softener settings to reduce the amount of water needed for backwashing and regeneration.
7. Spread out laundry or other major water-using chores over the week or day.

Action Checklist*

Household Wastewater

Write all high and medium risks below	What can you do about the risk?	Set a target date for action
Sample: Low area over drainfield is always wet	Have drainfield inspected for blockages, and clean as needed. Divert surface runoff.	One week from today: November 19

As always, your goal is to lower your risks. Use this action checklist to record your medium and high-risk practices. Use recommendations in this section to help you make plans to reduce your risks.

* Source NRAES-87, Home*A*Syst: An Environmental Risk Assessment Guide for the Home

Section 5: Managing Hazardous Household Products[6]

Some products used around the home contain ingredients that can pose threats to your health or the environment unless they are properly handled. Vapors from solvents, like paint thinner, can be hazardous to breathe. Other products like motor oil or pesticides, if disposed of on the ground, can contribute to the pollution of a stream or drinking water. This section will help you make choices that will reduce risks to your family and your Watershed. **You** are responsible for the safe use, reuse, or disposal of any products in and around your home. Household products can be hazardous if they include ingredients that, if improperly managed, can pose dangers to human health or the environment.

Unless product warnings and label directions are followed, health problems can be caused by some of the products in your home. Health effects can range from minor problems such as irritated skin or watery eyes, to more serious problems such as burns, poisoning, or even cancer. The potential harm from exposure to a hazardous product depends on: the type of chemicals in the product, how much of the chemical you are exposed to, how frequently you are exposed, and your size, weight, and overall health.

Ingredients in some household products can be hazardous to plants and animals in natural environments. For example, pesticides or motor oil washing into a stream can harm fish. Human health can also be threatened if our food, water, or air becomes contaminated through improper use or disposal of a household product. Most chemicals likely to cause environmental problems are regulated by federal and state laws. But, because it is difficult to keep track of the small quantities used by homeowners, we must all do our parts to minimize the impact of use and disposal.

To protect the environment, don't dump oils, paints, pesticides, or any other household chemicals on the ground, on roads, or down storm sewers. Don't dump products into a wetland, stream, or any other body of water. Don't wash chemicals off the driveway with a hose. Don't pour pesticides or non water-soluble chemicals into a drain that leads to a septic tank, or spray pesticides on a windy day. Be sure to use up a product according to label directions, and share any leftovers with a neighbor or local organization. Find out if a product can be recycled and where to recycle it, or bring appropriate products to the hazardous waste collection program sponsored by San Joaquin County in communities like Lodi.

Fill out the assessment on the next page to help identify your risks from hazardous products. Then read about recommended ways to select, purchase, use, and store these products at your residence on the following pages. Note all medium and high risks on the checklist at the end of this section. Using the checklist and information contained in this section, you can formulate an action plan to reduce the chances of hazardous household products harming your family or the environment. Also, plan to use the Hazardous Products examples and inventory list to learn about possible hazardous household products in your home.

---

[6] Collaborating author Elaine Andrews, Environmental Resources Center, University of Wisconsin Cooperative Extension.

Assessment 5-1: Product Selection, Purchase, Use, and Storage*

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Product selection	I always read labels; I understand signal words; and respect the health or environmental hazards labels describe. I choose the least hazardous product needed for the job.	I don't read labels or don't understand what they mean, but I use a "common sense" approach to safety.	I never read labels. I purchase products without considering what the product is made of or how it will be used.	❑ Low ❑ Medium ❑ High
Quantities purchased	I buy only what is needed for a specific job. I use up most of the product within a few months after purchase or give excess away to someone else.	I buy excess product, but provide safe and accessible storage.	I buy more than is needed, then purchase additional product without checking on current supplies.	❑ Low ❑ Medium ❑ High
Safety precautions	I follow label instructions and take recommended precautions against exposure (such as providing good ventilation and wearing safety goggles and gloves). I never mix products.	I occasionally read label instructions. I take some precautions. I occasionally mix products for specific cleaning tasks, but I always check safety precautions first.	I never follow label instructions and take no precautions-even when recommended. If one product doesn't work, I add in another without checking safety precautions.	❑ Low ❑ Medium ❑ High
Child safety	I store hazardous products in a locked cabinet or other location inaccessible to children.	I keep products out of the direct reach of children (on a high shelf, for example) but still accessible.	My products are easily accessible to children (for example, in an unlocked cabinet on the lower shelf).	❑ Low ❑ Medium ❑ High
Containers, storage location, and spill protection	I store leftovers in their original containers, properly sealed. Products are stored by type. My home environment is protected against leaks or spills.	I store original containers in a disorganized way. I don't provide protection against leaks or spills.	I store products in areas with poor ventilation such as basements, closets, or crawl spaces. Containers are damaged or left open.	❑ Low ❑ Medium ❑ High
Ventilation	I store volatile products (like solvents and petroleum-based fluids) in places with good ventilation.	I don't pay attention to storage location, but each container is in good shape and tightly sealed.	I store products in areas with poor ventilation such as basements, closets, or crawl spaces. Containers are damaged or left open.	❑ Low ❑ Medium ❑ High

* Adapted with permission from NRAES-87, Home*A*Syst: An Environmental Risk-Assessment Guide for the Home.

Product Selection, Purchase, Use, and Storage

By carefully selecting a product for the job needed, you can control the degree of "hazard" at your home or property. It can be difficult to find out what is hazardous and how and to whom something is a hazard. Labels contain important information and often tell if a product could be hazardous. But, absence of a warning does **not** mean that the product is safe. Old products or those not designed for household use might not contain consumer information on the label.

Information on the product label can help you decide whether a product is right for the job and if it can be used safely in your situation. Household consumer products that are hazardous or contain hazardous substances are required to have human safety information or warning labels. Before you purchase or use a product, take the time to read the label. These labels provide details about how to safely use, store, and dispose of a product as well as first aid instructions when appropriate.

Signal words such as **caution**, **warning**, and **danger** draw your attention to important human safety information. On household products, they describe immediate health effects resulting from improper use. Products labeled **danger**, **flammable**, **poison**, **vapor harmful**, or **fatal if swallowed** can contain ingredients that could cause environmental damage as well as health problems if used, stored, or disposed of improperly.

When choosing among several brands of the same kind of product, read the labels to learn which product will meet your needs most safely. If you don't check first, you might buy a hazardous product such as a solvent-based cleaner when a detergent-based cleaner is available—or a common alternative like a kitchen cleanser will work.

Buy Only What You Need

If you buy more than what you need, household products will accumulate and create storage problems. If unused for long periods of time, product containers can become damaged and leak or products might change chemically and be less effective when you try to use them again.

Safe Storage

Leftover or used chemicals such as strippers, paint, waste oil, used engine coolant, and solvents may need to be stored until their next use or disposal. When storing these products, the primary concerns are child safety, indoor air quality, and prevention of damage to the household equipment or the environment. If you can smell a household product while it is in storage, the product lid may be loose, or ventilation may be inadequate to protect your health.

Be sure to separate *corrosives* like acids or lye from each other and from other hazardous products to prevent dangerous *chemical reactions*. Reactions occur when corrosives leak from their containers and drip or flow to other products. Corrosive materials are often stored where equipment and appliances are located. Be aware that they can corrode air conditioning and heating systems, hot water heaters, and other equipment or appliances. Routinely check areas where you store household products to make sure containers are closed tightly and not leaking, and that the sides of containers are not bulging.

Assessment 5-2: Product Disposal*

WASTE CATEGORY	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Household trash Trash containing plastics or empty containers of hazardous ingredients.	I rinse empty yard and garden pesticide containers and include rinse water in yard and garden management. I dispose of ash, mixed trash, and empty product containers at the community landfill. I do not burn trash.	I dispose of ash from mixed trash, leftover pesticides, and solvents on my property, but away from my well or waterway. I do not burn hazardous containers.	I always dispose of ash from mixed trash, leftover pesticides, and solvents near a well or waterway. I burn hazardous containers.	❑ Low ❑ Medium ❑ High
Strong acids and bases Found in hobby and recreation products, concentrated building cleaners, and building repair products.	I share any leftover products. I dilute strong acids and bases and pour them down a household drain that connects to a sewage treatment facility.	I pour strong acids and cleaners down household drains without first diluting them with water. I send leftovers to a landfill (with proper protection for garbage haulers and employees).	I pour strong acids and cleaners directly into a storm sewer or waterway or on a paved slope leading to a waterway.	❑ Low ❑ Medium ❑ High
Antifreeze, waste motor oil	I recycle antifreeze and waste motor oil by taking them to properly qualified dumping stations.	I pour my used antifreeze into a septic system or municipal treatment system.	I dump used antifreeze and waste oil always in the same place near a well or waterway. I dump these materials directly into a waterway.	❑ Low ❑ Medium ❑ High
Batteries May contain mercury, cadmium, or lead.	I recycle batteries or take them to a hazardous waste disposal program.	I dispose of batteries in a community landfill.	I always dump batteries near a well or waterway.	❑ Low ❑ Medium ❑ High
Bottled gas	I recycle bottled gas containers.	I store containers that may still contain some gas.	I put containers in my trash or leave them lying around.	❑ Low ❑ Medium ❑ High

* Source: NRAES-87, Home*A*Syst: An Environmental Risk-Assessment Guide for the Home.

Assessment 5-2: Product Disposal *(continued)*

WASTE CATEGORY	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Cleaning and repair products containing hazardous solvents (non-water-soluble) and paint	I share leftovers when possible. I take leftover products containing mercury, pesticides, or hazardous solvents to a hazardous waste disposal program.	I dispose of leftover products in a community landfill.	I always dump leftover products. I dump leftovers near a well or waterway. I dump all my leftovers directly into a waterway. (NOTE: *this is illegal)*	❑ Low ❑ Medium ❑ High
Fluorescent bulbs Contain mercury	I recycle burned-out fluorescent bulbs or lamps.	I put my burned-out bulbs in the trash	I leave my burned-out bulbs at a dump.	❑ Low ❑ Medium ❑ High
Pesticides	I use preventative actions to control pests, indoors and outdoors. I explore options for non-chemical pest controls. I properly choose, store, handle, apply, and dispose of chemical pest controls.	When solving pest problems, I do not practice much prevention nor explore non-chemical options.	I DO NOT handle pesticides as directed on the label.	❑ Low ❑ Medium ❑ High

Product Disposal

Unless a product is used up, you will have to dispose of it. For some products that are especially hazardous, like pesticides, even the product container will have to be disposed of properly. Disposal should be your last option because it is wasteful, and unless done properly, it can be unsafe for you and the environment. You can avoid the disposal problem by buying only what you need, using up leftovers, or recycling. By giving left over products to a neighbor or a local organization that can use them, you can turn a potentially wasteful problem into a cost-saving opportunity.

Household hazardous waste collection programs are held in San Joaquin County. Since only certain hazardous products are accepted, contact the program at (209) – 468 – 3066 to learn exactly what materials are accepted, and to get the dates and locations for collection sites. Used motor oil and engine coolant, for example, are accepted by some automobile shops and auto parts stores for recycling.

Paint and Pesticides

Municipalities that collect leftover hazardous household products report that paints make up about half of the material that people bring and thus are a costly (but avoidable) disposal expense. The best practice is to calculate how much paint you'll need before you buy it. Most leftover paint can be safely managed by sharing it with neighbors or organizations. But, exterior paints containing mercury, lead, or pesticides should be treated as hazardous waste.

Before using a pesticide, be sure that you have exhausted other options for managing the pest, weed, or fungus problem. There are several simple ways to do this: maintaining regular cleaning habits, especially in the kitchen area, caulking cracks and other openings to the outside, keeping screens repaired, and keeping houseplants healthy by providing appropriate care. If you do need to use a pesticide, be sure to read label information carefully before purchasing and buy only what you need.

Pay attention to use and disposal recommendations on labels. Before disposal, use up the product if possible. Rinse empty containers of liquid pesticides and use the rinse water as part of your yard and garden management. Section 7 of this handbook provides advice for managing yard and garden pesticides.

It is never appropriate to dump or burn hazardous products on your property, and products should **never** be poured down storm sewers. *Water-soluble* cleaning products can be safely disposed of down home drains if you flush the drain with plenty of water.

Septic system owners must be especially careful. The rule of thumb for septic systems is moderation. Don't dump large amounts of anything into a septic system. These systems are not designed to treat chemicals. If the product is specifically designed for home use with water, then moderate use will not harm the system.

Action Checklist*

Managing Hazardous Household Products

Write all high and medium risks below.	What can you do to reduce the risk?	Set a target date for action.
Sample: Cabinet with paint stripper and engine coolant is not child-proof.	Buy a lock and install it on cabinet.	One week from today: February 26

* Source: NRAES-87, Home*A*Syst: An Environmental Risk-Assessment Guide for the Home.

Hazardous Product Examples and Inventory*

Category/Product	Is it properly stored?	Is information about proper disposal needed?	Are there special precautions to keep in mind?
HOUSEHOLD TRASH			
Ash/sludge from burned home or garage trash			
Fluorescent bulbs (might contain mercury)			
Waste motor oil			
Plastic wraps and containers (only hazardous when burned)			
Pesticide or solvent containers			
Empty containers from other product categories listed below			
CLOTHING AND FABRIC CARE PRODUCTS			
Mothballs			
Dry-cleaning fluids			
Spot removers (solvent-based)			
Shoe/leather polishes			
HOBBY AND RECREATION PRODUCTS			
Artist paints and solvents			
Charcoal lighter fluid			
Strong acids/bases			
Bottled gas			
Household batteries (might contain mercury or cadmium)			
BUILDING/WOOD CLEANERS AND REPAIR PRODUCTS			
Building and wood cleaners with organic ingredients:			
• Wood polishes			
• Products for wood floor and panel cleaning			
Building and equipment maintenance products:			
• Strong acids/bases			
• Lead-based paint			

* Source: NRAES-87, Home*A*Syst: An Environmental Risk-Assessment Guide for the Home.

Hazardous Product Examples and Inventory *(continued)*

Category/Product	Is it properly stored?	Is information about proper disposal needed?	Are there special precautions to keep in mind?
BUILDING/WOOD CLEANERS AND REPAIR PRODUCTS (continued)			
Building and wood cleaners with organic ingredients:			
• Oil/*alkyd* paints and primers			
BUILDING/WOOD CLEANERS AND REPAIR PRODUCTS			
• Marine and exterior paints containing mercury and/or pesticides			
• Aerosol paint products			
• Stains and finishes			
• Roof coatings and sealants			
• Rust removers			
• Silicon lubricants			
• Other lubricants			
• Adhesive removers			
• Paint and finish preparation products			
• Adhesives such as glues and caulk			
• Wood-preserving products			
• Products for brush or spray gun cleaning			
• Water repellents for wood and cement			
• Solvents, such as those used in degreasers and paint thinners, stains, and varnishes			
PESTICIDES			
Pesticides labeled "restrictive use"			
General use pesticides			
Old and unwanted pesticides			

Hazardous Product Examples and Inventory *(continued)*

Category/product	Is it properly stored?	Is information about proper disposal needed?	Are there special precautions to keep in mind?
VEHICLE MAINTENANCE CHEMICALS			
Vehicle maintenance products such as engine coolant, oil and grease, and transmission fluid			
Solvents for oil and grease removal and disposal			
Engine and parts cleaners such as carburetor and brake cleaner			
Paints and paint preparation products			
Lead acid batteries			
Battery terminal protector			
Tire cleaners			
Rust removers			
Ignition wire dryer			
Gasket removers			
Aerosol paint and primer products			
Brake quieter			
Brush and spray gun cleaners			

Section 6: Yard and Garden Care[7]

Most homes today, especially in residential areas, are landscaped with lawns, gardens shrubs, and trees. This section of the handbook examines the potential impact of yard and garden care on the environment.

The natural settings of your home and property might be the last places you might look for pollution and stormwater runoff problems. But on average, homeowners use ten times more chemical fertilizers and pesticide per acre than farmers use on farmland. Especially if applied improperly, these chemicals can pollute nearby lakes and streams and find their way into drinking water wells.

Indiscriminate watering of lawns and gardens wastes large amounts of water. Other problems occur when exposed soil washes away during a storm, harming wildlife habitat and choking waterways.

Gasoline-powered mowers, weed cutters, leaf blowers, and other devices pollute the air. A lawnmower powered by a two-cycle engine spews the same amount of exhaust as a car driven 350 miles! Though it might seem that what you do at your property is minor, the effects of chemicals, soil loss, and wasted water from thousands of homes in a watershed can add up in a hurry.

Fortunately, you can have a low maintenance yard without losing the well-kept appearance of your home. Good management practices not only benefit the environment, they can also save you time and money.

Imagine how much less time lawn care would take if grass clippings were left on the lawn instead of being raked and/or bagged. Think about the cost, time, and effort it would take to replace a lawn or garden damaged by over-fertilization or misuse of pesticides.

The assessment table on the following page will help you identify potential environmental risks related to your yard and garden maintenance practices. Although some choices might not correspond exactly to your situation, choose the response that best fits. Then read the text in the following section to identify simple and inexpensive ways you can reduce your risks.

---

[7] Collaborating authors K. Marc Teffeau, Wye Research and Education Center, University of Maryland Cooperative Extension and Ray Bosmans, Home and Garden Information Center, University of Maryland Cooperative Extension.

Assessment 6-1: Yard and Garden Care*

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Fertilizers	Soil is tested for nutrients, and fertilizer is used as recommended	Soil is tested, but more fertilizer is used than recommended.	Soil is not tested, and fertilizer is used in large amounts.	❑ Low ❑ Medium ❑ High
Pesticides	Label instructions for chemicals are strictly followed or non-chemical or low-toxicity methods (such as integrated pest management) are used to control pests.		Chemicals are used without regard to label instructions or conditions.	❑ Low ❑ High
Lawn (turf) type and maintenance	Grass is suited to soil type, available sunlight, and climate. Grass is pest-resistant and mowed to the proper height.	Grass is suited to the site but is well fertilized and mowed short.	Grass type is not suited to available light, soil type, or climate. Grass is pest-prone and mowed too short.	❑ Low ❑ Medium ❑ High
Ground cover and other plantings	Ground covers, flowers, trees, and shrubs are planted to reduce soil erosion. Plantings resist insects and disease.	A slow-spreading ground cover is used.	A hilly landscape or lack of ground cover causes soil erosion. Plants require insect and disease fighting chemicals to survive.	❑ Low ❑ Medium ❑ High
Composting	The compost pile is well-maintained: it is aerated regularly and contains yard waste, vegetable food scraps, and a nitrogen source such as manure	The compost pile is poorly maintained: it is not aerated or lacks the proper mix of materials. Dog, cat, and other pet wastes are added to the pile.	The compost pile is poorly maintained: it contains excessive high-nitrogen material and is not turned regularly. The pile is less than 50 feet from a shallow well or surface water.	❑ Low ❑ Medium ❑ High
Water requirements of plants	Grass, flowers, trees, and shrubs are able to survive with normal rainfall.	Landscape plants require light to moderate watering.	Heavy watering is required to keep the lawn and other plants alive.	❑ Low ❑ Medium ❑ High
Watering methods	Watering is done in the morning or evening, only as needed. Low-water use devices (like soaker hoses) are used. The sprinkler system is on manual control.	Watering is excessive. (For example, the sprinkler is left unattended, and much water lands on the pavement.)	Watering is done during the heat of the day. The sprinkler system is used daily without regard to weather conditions. There is excessive water runoff.	❑ Low ❑ Medium ❑ High

* Source: NRAES-87: Home*A*Syst: An Environmental Risk-Assessment Guide for the Home

Managing Lawns, Gardens, and Landscaping

Normal applications of lawn and garden products generally pose few problems. A properly maintained home landscape can even help reduce soil erosion and increase water retention and soil fertility. Poor maintenance through either neglect or excessive chemical use can lead to soil problems, polluted runoff, and unsafe well water.

The first step is to have your soil tested. Soil already has some of the nutrients needed for good plant growth (i.e., nitrogen, phosphorous, and potassium). It is important to find out how much of each nutrient is present so you will know how much and what kind of fertilizer to use. Adding fertilizer without first testing your soil is like taking medicine without knowing if you need it. Check with your local cooperative extension office or garden supply store about soil testing.

The soil tests will let you know if your lawn needs fertilizer, and if it does, how much and where. If you apply fertilizer at the wrong time or in the wrong amount, you can make conditions worse and insect and disease problems can increase. Excess fertilizer is likely to wash away before grass can take it up. Fertilizer in runoff contributes to unwanted plant growth in nearby streams and lakes. In sandy soils, nitrogen and other chemicals can seep downward and enter groundwater that is used for drinking.

If you hire a lawn-care service, make sure they test your soil before applying fertilizer. Insist that the fertilizers only be applied when the weather is favorable (no wind, rain is not expected for at least 24 hours). Be sure to keep pets and children away from treated lawns for at least 24 hours. Always sweep excess fertilizer off of walks and back onto the lawn so it doesn't get washed into storm drains by rain or sprinklers. Non-chemical fertilizers such as compost, fish meal, and other soil treatments should be applied based on the needs of your lawn.

Proper Lawn Care

Cutting grass to the right height is important. Lawns cut too short invite weeds to invade. Grass clippings should be left on the lawn. In many cases, they supply enough natural fertilizer so that only minimal additional fertilizer is needed to keep your lawn green and healthy. Clipping should be swept off of paved surfaces so they don't get carried away by stormwater.

Switching to a human-powered or *reel mower* can reduce air and noise pollution, and provide exercise. If you reduce your lawn size and grow plants that require little maintenance, a reel mower can be very practical. If your lawn is too large to efficiently use a reel mower, consider an electric lawnmower.

Making *compost* is a cost-effective, natural way to handle leaves, grass clippings, and other yard wastes. Composting creates an organic, slow-release fertilizer and soil-enhancing material. It takes advantage of nature's recycling system for breaking down plant and other organic materials. To compost, simply put yard wastes in a pile, or install home made or

purchased bins to contain the material. In addition to yard waste, you can add vegetable trimmings and fruit peels, and coffee grounds from your kitchen. The compost pile will remain relatively odor-free if it is turned and aerated regularly.

Finished compost can be mixed into garden soil or spread on lawns as a slow-release fertilizer. Check the library, your local Cooperative Extension Office, or garden stores for suggestions and other ideas (see page 65 for contact information).

Residents of rural areas should be cautious about using animal manures in compost. Many animal manures contain high levels of nitrogen, and different types of manures have different nitrogen levels. If you mix manure from horses, sheep, cows, or other plant-eating animals into your compost, add plenty of high-carbon materials such as leaves, straw, or sawdust to keep concentrations of nitrogen and other nutrients low. This will help prevent contamination of runoff and groundwater. Do not put pet wastes (for example, cats and dogs) into compost piles due to potential parasite and disease problems.

Pesticide Use

Pest prevention is often simpler and cheaper than pest removal. Pests will be less of a problem if you have disease resistant grasses and other plants. Grass and native plants suited to local rainfall amount, temperature, soil type, and available light will always be more resistant, and require less chemicals than other types. Consult will your cooperative extension office or the California Native Plant Society for advice.

If properly used, pesticides can pose only a minimal risk to your health and the environment. Correctly identifying the pest is the most crucial step. Many plant problems are related to temperature extremes, over-watering, drought, damage caused by lawnmowers, or overuse of chemicals, rather than by insects.

When using pesticides, apply them only where pests occur. Select chemicals that are the least toxic or that break down quickly into less harmful substances. Be sure to read the label carefully and follow all directions for application rates and methods. And always ask yourself if you can tolerate a few more weeds and "bugs" around your home for the sake of clean groundwater and an environment with fewer chemical pollutants.

Integrated Pest Management or *IPM* is a systematic approach to controlling pests in your landscape. Weeds can be controlled by hand-pulling or hoeing, and bugs can be removed by picking them off vegetables and garden plants. Cleaning up dead leaves and debris removes potential pest homes. Using natural predators to control pests is another method. Release beneficial insects and microorganisms that feed on pest insects into your garden. For IPM to work, you will have to give a little more time and attention to your yard and garden.

When you have no other choice, try to find nontoxic or low-toxic chemicals such as insecticidal soaps. Follow directions carefully, and mix only the amount you need.

Watering Practices

The average American uses about 200 gallons of water each day. This includes water used for cooking, bathing, washing clothes and dishes, and drinking. Up to half of that total is used for landscaping and gardening, depending on climate, the time of year, and the plant species on your property. Because of the long dry season in California's Central Valley, many homes have automatic sprinkler systems for lawns, gardens, and landscape plants. It is not unusual to go up to five months without rain in the watershed. Because so many people must water their lawns and gardens, it is vital to use efficient watering practices.

Watering should be timed to meet the biological needs of plants. Watering slowly and deeply helps develop deep roots, and in the long run plants will require less frequent watering. Because of the long dry season, the use of native plants that are accustomed to the hot, dry summers of the valley might be the only way to reduce your water usage. Consider using drought-resistant turfgrass species for your lawn, such as tall fescues or buffalo grass. Perennial flowers conserve water because their roots grow deeper than annual flowers and require little or no watering once they are established.

Plants can absorb only so much water. Overwatering wastes water and can injure certain plants. Some estimates indicate that up to 85% of all landscape problems are directly related to over-watering. Placing several containers with marks at one-inch intervals under your sprinklers will help you gauge how much water your lawn or garden is getting. Drip irrigation systems and soaker hoses deliver water to the intended plants more efficiently than *broadcast spraying*.

The time of day when you water matters, too. Early morning is the best time of day. It allows the water to get deeper into the soil with minimal evaporation. If you water during the heat of the afternoon, much water can be lost to evaporation. Try using a wood chip or other kind of mulch in gardens and around shrubs and trees. Mulch helps to cover and cool the soil, and it helps discourage evaporation, weed growth, and erosion.

Preventing Erosion

Soil washed away by runoff can pollute streams, lakes, and wetlands. Even if you don't live near water, soil can eventually be carried to surface water in runoff from. Gardens, lawns, and construction sites with areas of bare soil, especially on sloped land, are prone to soil erosion.

Using mulch or planting ground-cover vegetation can help reduce erosion and protect soil at the same time. Using landscape fabric is another option. On steep slopes, plant a vigorous ground cover and avoid turfgrasses, which require mowing and watering. You can also help prevent soil loss by building terraces or retaining walls on slopes. Again, be sure to choose plants that are suited to the area and resistant to insects and diseases.

In general, your lawn will require three to four feet of water per year (including rainfall). If you are putting more than this amount on your lawn (use the container method mentioned above to measure), you are likely overwatering. Consult your Cooperative Extension Office or local garden store for advice on improving watering efficiency.

Local Laws Governing Water Use for Lawns and Gardens

If you live within the city limits of Lodi, you are subject to the requirements of the City of Lodi Water Conservation Ordinance. This conservation measure seeks to help the city conserve precious freshwater resources while still providing ample water for landscaping and other household needs. Lodi residents should be aware of some simple guidelines contained in the ordinance designed to eliminate the wasting of water. These provisions include:

- Watering of lawns, gardens, outdoor plants, and landscaping is allowed only on permitted watering days. Houses with odd-numbered addresses may water on Wednesdays, Fridays, and Sundays. Houses with even-numbered addresses may water on Tuesdays, Thursday, and Saturdays. Watering is not allowed on Mondays.

- Watering lawns, gardens, outdoor plants, and landscaping is only permitted before 10 a.m. and after 6 p.m. from May 1 through September 30 each year. Watering between 10 a.m. and 6 p.m. is prohibited during these months.

- Allowing excess water to flow into a gutter or any drainage area for longer than three minutes is prohibited.

The ordinance also bans the use of a hose for washing down sidewalks, driveways, parking areas, patios, and other paved areas or buildings including tennis and basketball courts. There are no open hoses allowed. A bucket should be used to wash motor vehicles, trailers, boats, and other moveable equipment. A hose can be used only to rinse these items, but not for more than three minutes.

A common sense suggestion is to shut off all automatic sprinkler systems during and following rain. This is especially true from November 1 through February 28, which are the predominant months for rain in California's Central Valley. During this time, one watering per week or less should be more than enough. It is best to turn automatic sprinkler systems off from November 1 to May 1, and use the systems on a manual setting only if it has not rained for more than two weeks.

Action Checklist*

Yard and Garden Care

Write all high and medium risks below.	What can you do to reduce the risk?	Set a target date for action
Sample: Fertilizers applied but soil has never been tested.	Find laboratory that does soil testing. Take samples and send them to lab.	One week from today: March 15

* Source: NRAES-87, Home*A*Syst: An Environmental Risk-Assessment Guide for the Home.

Section 7: Liquid Fuels: Safe Management of Gasoline, Heating Oil, Diesel, and Other Fuels[8]

We use liquid fuels every day to power vehicles, run machines, and heat homes. If you are like most people, you own at least one fuel-burning device such as a lawnmower. You likely keep fuel for these devices in portable containers that hold from one to five gallons. For home heating and vehicle use, especially in rural areas, you might have larger quantities of fuel in underground, basement, or aboveground storage tanks.

Fuel stored in portable containers, and in the gas tanks of fuel-burning devices such as leaf blowers, weed trimmers, chain saws, auxiliary generators, or motorboats, is a potential risk to groundwater and surface water. Fuels are hazardous and can pollute the water you drink and the air you breathe if improperly managed. As little as one gallon of gasoline can quickly contaminate groundwater above health advisory levels. Petroleum products contain many toxic compounds, including *benzene*, which is known to cause cancer.

Don't depend on taste or smell to alert you about fuel in your drinking water. Unknown or forgotten underground tanks have come back to haunt property owners. Contaminated soil and water can make property values plummet, trigger environmental liability and costly cleanups, and drive away lenders and prospective buyers. Fuel vapors can ignite fires or collect underground and explode.

Aboveground and underground fuel storage tanks generally are not found in residential areas of Lodi, however they might be used by some businesses, or by residents in rural areas of the watershed. Fuel stored in large tanks pose greater risk of contamination than the small quantities stored for lawnmowers and similar equipment. Though it is important to pay particular attention to the high potential risks from large tanks, storing any amount of fuel increases the environmental risks around your home. For suggestions and precautions regarding management of large fuel tanks on your property, refer to the "Special Considerations" section of this handbook.

Improving fuel storage and management protects the health of your family, the community, and the environment. Better management will also safeguard your home. Check all the places where you store fuels at your home. Use the assessment table on the following page to evaluate your practices.

The assessment table will help you identify potential environmental risks from fuel storage on your property. Although some choices might not correspond exactly to your situation, choose the response that best fits. Then read the text in the following section to identify simple and inexpensive ways you can reduce risks to your family and the environment.

---

[8] Collaborating authors Richard Castelnuovo, National Farm*A*Syst Office, Madison, Wisconsin and Dean Solomon, Michigan State University Extension.

Assessment 7-1 Liquid Fuels: Portable Fuel Containers*

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Quantities Stored	Moderate amounts of fuel are purchased. Fuel is stored for less than six months.	Fuel is stored more than six months before use.	Excess quantities of fuel are purchased. Fuel is stored more than twelve months.	❑ Low ❑ Medium ❑ High
Container Safety	Fuel is stored in UL-approved or original sale containers.	Fuel is stored in a UL-approved or original sale container with signs of age or damage	Fuel is stored in a non-approved container (for example, a glass jar or open container)	❑ Low ❑ Medium ❑ High
Storage Location	Fuel is stored in a well-ventilated, unattached garage or shed away from the house. Concrete floor is best.	Fuel is stored in a garage attached to the house. The area is poorly ventilated.	Fuel is stored inside the home or in the basement. Dirt floor is least safe.	❑ Low ❑ Medium ❑ High
Management and Disposal	Fuel is used up in devices, so disposal is unnecessary.	Fuel is stored on-site indefinitely or until evaporated.	Fuel is poured down a house drain or storm drain, poured on the ground, or sent to a landfill. (These practices are illegal)	❑ Low ❑ Medium ❑ High
Leak Detection	Storage containers and fuel-driven devices are examined often for leaks.	Storage containers and fuel-driven devices are sometimes examined for leaks.	Storage containers and fuel-driven devices are never examined for leaks.	❑ Low ❑ Medium ❑ High

* Adapted with permission from NRAES-87, Home*A*Syst: An Environmental Risk-Assessment Guide for the Home

Portable Fuel Containers and Tank Location

It is best to purchase and store minimum amounts of fuel for short periods. This means you should buy in small quantities and buy no more than you need for a month or so of mowing the lawn. It is also important to use only safe, approved, or original sale containers to store fuels. UL-approved containers (red for gasoline, blue for kerosene, and yellow for diesel) can be purchased in places as convenient as your local hardware store. The container should be clearly labeled to identify its contents, and fitted with a spout or other device to allow pouring without spilling.

Be careful when pouring gasoline, a fuel mixture, or other recommended fuels into a motorized device. Use a drip pan under your work area to avoid spills. Absorb any spills with kitty litter, sawdust, or corn meal. You can dispose of the materials from a small spill by placing them in a plastic bag in the garbage. Materials from a large spill should be taken to a hazardous waste disposal event.

Storing fuels in an uncovered or unapproved container, such as a glass jar or plastic jug, is dangerous. For an extra measure of spill protection, keep fuel containers inside a bucket or other container that can prevent leaks from spreading.

Keep Containers Safe and Check Them Regularly

To reduce the health hazards and fire danger of fuel vapors, be sure to keep fuel containers and fuel-powered devices in a secure, well-ventilated place with a paved floor. Storage in an unattached shed or garage is safer than storing them in a garage attached to the home. Store containers off of the floor and keep them out of the reach of children. Make sure the lids are tight to prevent easy access.

Check for leaks from storage containers and fuel driven devices periodically, especially if they haven't been used for some time. Small leaks can add up over time. It's best to keep a regular schedule of inspection and maintenance. Always recycle or safely dispose of engine maintenance products (see Section 5, Managing Hazardous Household Products for more information about disposal and recycling).

It is crucial to know about fuel storage tanks on your property. This includes tanks that are currently in use and those that are abandoned. As a tank owner, you have many responsibilities and must keep up with increasingly strict laws. You are also financially responsible for leaks from a tank on your property, even if you are unaware that the tank exists.

Standard homeowners insurance typically will not cover the costly clean-ups that can be required. To learn more about your legal responsibilities, contact state environmental and health officials.

Action Checklist*

Liquid Fuels: Safe Management of Gasoline, heating Oil, Diesel, and Other Fuels

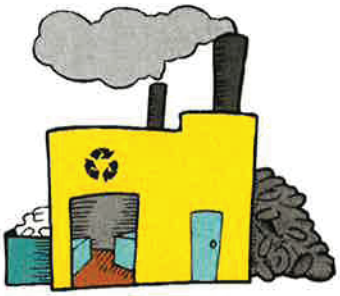
Write all high and medium risks below.	What can you do to reduce the risk?	Set a target date for action.
Sample: Gas for lawnmower stored in a glass jug.	Buy a UL-approved container from the hardware store.	One week from today: April 2

* Source: NRAES-87, Home*A*Syst: An Environmental Risk-Assessment Guide for the Home

Section 8: Managing Household Waste: Preventing, Reusing, Recycling, and Composting[9]

There are many alternatives for disposing of household waste, and many ways to reduce the amount of waste we each generate. Consumption practices and waste disposal have a definite effect on air, soil, and water quality in your home, on your property, and in your community.

Surveys show that most consumers do not realize what makes up solid waste. Many people think that we throw away more plastics by weight than we really do, or that disposable diapers are a larger part of the *solid waste stream* than they really are. In reality, U.S. EPA figures show paper and paperboard make up nearly 39 percent of this country's solid waste; the largest percentage of any type of solid waste. Yard waste like leaves and grass clippings is the next largest component at nearly 15 percent. Plastics actually come in third at just under 10 percent.



But it is important to understand the extent of the waste we produce as a nation. The United States leads the world in the amount of waste produced, energy consumed, and in use of the earth's natural resources. This is **not** a good thing. Consider that we as a nation use up to 50% of the world's non-renewable resources, and by some estimates produce 38% of the world's waste. By contrast, the U.S. has only 6% of the world's population. Changing from a resource-consuming lifestyle to a resource conserving one will help maintain natural resources while creating less waste.

For purposes of working through this section, here are some terms you should know: *Trash* or *waste* includes items and materials that are no longer wanted, anything that is useless or discarded. *Reusables* are items that are used again for a different purpose. For example, a jelly jar that is used as a drinking glass but not reprocessed into raw materials, and then a new product. *Recyclables* are materials like glass, metal, paper, oil, and even refrigerators that are collected, separated, and processed back into raw materials to be made into new products. *Compostables* are primarily yard and food wastes that can decompose and return to the earth as nutrients or soil. *Garbage* is generally food waste or wet food of either plant or animal origin. *Municipal solid waste (MSW)* is household waste combined with commercial, business, and institutional waste.

Use the assessment table on the following page to identify areas where you can minimize waste. Indicate your waste potential in the right-hand column. Some choices might not correspond exactly to your situation, so choose the response that best fits. Then read the text on the following pages for ideas on how to prevent and minimize waste around your home. Take note of all medium and high waste potentials, and write them down on the checklist at the end of this section.

---

[9] Collaborating authors Shirley Niemeyer, University of Nebraska-Lincoln; Michael P. Vogel, Montana State University Extension Service; and Kathleen Parrott, Virginia Polytechnic Institute and State University.

Assessment 8-1: Preventing and Minimizing Waste, Reusing, Recycling, Composting*

	LOW WASTE POTENTIAL	MEDIUM WASTE POTENTIAL	HIGH WASTE POTENTIAL	YOUR WASTE POTENTIAL
Quantities purchased	I only buy what I need and avoid accumulating unused products.	I sometimes buy more product than I can use.	I often buy more product than I can use.	❑ Low ❑ Medium ❑ High
Product durability and potential for reuse	I select products based on their durability, ease of repair, and potential for reuse.	I sometimes consider durability, ease of repair, or potential for reuse.	I never consider durability, ease of repair, or potential for reuse.	❑ Low ❑ Medium ❑ High
Recyclability of packaging	I regularly purchase containers/packaging that can be recycled locally.	I sometimes consider recyclability when making purchases.	I never consider recyclability.	❑ Low ❑ Medium ❑ High
Packaging selected	When safe to do so, I select packaging that minimizes waste.	I sometimes consider packaging that minimizes waste.	I never consider packaging that minimizes waste.	❑ Low ❑ Medium ❑ High
Reusing	I reuse as many household wastes as possible	I reuse items when it is convenient to do so.	I never reuse items.	❑ Low ❑ Medium ❑ High
Recycling	I recycle as many household wastes as possible.	I recycle when it is convenient to do so.	I never recycle.	❑ Low ❑ Medium ❑ High
Composting	I compost all yard wastes and kitchen vegetable scraps at home or in a city program.	I compost some yard or kitchen wastes.	I never compost.	❑ Low ❑ Medium ❑ High

* Adapted with permission from NRAES-87: Home*A*Syst: An Environmental Risk-Assessment Guide for the Home.

Preventing and Minimizing Waste

Each day we make purchasing decisions, and every purchase involves a certain amount of waste production and use of natural resources. Your decision to select a certain product or no product at all will determine the type and volume of waste that you will someday discard. You can use your purchasing power to minimize your impact on the environment by selecting products that minimize waste, last longer, and use less natural resources. These practices are sometimes referred to as *precycling* and *enviro-shopping*.

Enviro-shoppers typically ask the following questions before making a purchase:

- How much do I need?
- Are my purchases long-lasting and reusable?
- Is the product package recyclable?
- Is the product or its packaging made from recycled materials?
- Do I buy products with the least amount of packaging?

These questions are very important. Primarily, enviro-shopping means buying only what you need. A good price on bulk packaging might seem like a good deal, but you can end up wasting money and natural resources because unused or spoiled product will eventually have to be thrown away. Similarly, long-lasting and reusable products might seem more expensive but they can be a better investment in the long run. Look for products that can be: fixed when broken, reused, passed on to someone else, or used for another purpose. For example, reusable gift bags can reduce the need to buy wrapping paper.

Many product containers and packaging materials are potentially recyclable. To promote recycling, many manufacturers use a recycling symbol featuring chasing arrows (below). But be aware that this symbol could mean that the product or packaging is made from materials that are **suitable** for recycling if your local recycling program will take them. If you can't recycle it locally, you might be able to take materials to a neighboring community that will accept it. But, be careful not to waste more natural resources (like gasoline) than you will save by recycling. Combine a trip to the recycling center with other tasks.

A variety of products, from carpets to detergent bottles to trash bags, are made from recycled material. Recycled materials will be made into new products only if there is a market for them. You can support and encourage markets for recycled material products by buying items made from recycled material. Look for the words "made from recycled materials" or "made from *post-consumer* recycled materials." Post-consumer recycled materials are those made from materials that have been recycled by consumers like you. For example, billions of recycled beverage cans are melted down and made into new cans each year.

About one-third of the paper, plastic, glass, and other material we throw away comes from packaging. While packaging provides some useful services like preventing food spoilage and ensuring consumer safety, some unnecessary packaging wastes natural resources and becomes waste soon after a product is purchased. Good enviro-shopping means choosing products that have the least amount of packaging while still assuring your safety.

Reusing, Recycling, and Composting

Reusing items should be the first objective in minimizing waste, because it typically has the least environmental impact. Returnable glass beverage bottles are an example of a reusable product. Reuse is often limited only by the imagination. If you take some time to think, it is easy to find uses for more materials than you realize. Sharing old clothes and used furniture is a common form of reuse. If you can't share them with family or friends, or sell them at a garage sale, why not donate items (in good condition) to homeless shelters, thrift shops, or organizations like Goodwill.

See if a local gift shop or store will take foam packaging "peanuts," or whether neighbors or local organizations have any use for excess paint, lumber, or empty plastic pails. Or, put a list of excess materials on a postcard or piece of paper and post it on a local community bulletin board.

Recycling

Many communities in California, including Lodi, operate curbside recycling programs. Have you checked recently to see what kinds of items are generally accepted in the containers provided by the municipality where you live? Materials accepted by these programs go far beyond glass and aluminum. Many programs also accept catalogs, envelopes, junk mail, aluminum foil and trays, plastic bottles and jugs, tin and steel cans, chipboard, corrugated cardboard (including shoeboxes), and newspapers. Check with the city or your waste-hauling contractor to get a complete list of acceptable items. The more items you can put in the recycling bin, the less will go to a landfill. And, recycling helps to save natural resources. Use the information sheet on the next page to keep track of what is recycled locally, where to take the items (if they aren't accepted in curbside pick-up), and how to prepare them for recycling.

Many local communities also collect yard and garden waste such as grass clippings, cuttings from trees and shrubs, and weeds. You might consider using some or all of your yard and garden waste for composting. When combined with some kinds of kitchen scraps, yard and garden waste can be turned into a natural soil conditioner and fertilizer.

Materials from around the home that can be composted include: leaves, grass clippings, plant trimmings, straw, kitchen scraps (like coffee grounds and vegetable trimmings, but **not** animal wastes, fat, bones, or pet waste), ash from your wood-burning fireplace, and even small amounts of paper.

The end product is a dark brown, crumbly material that has a clean, earthy scent. You can spread it on lawns, or mix it with garden soil. To compost at home, you can use one of the many compact and efficient composting bins on the market, or you can build your own. The local cooperative extension service can provide you with more detailed information about composting.

What Can You Recycle In Your Area*

Item	Recycled where?	How should it be prepared?
Paper/cardboard		
Glass		
Plastic		
Aluminum		
Steel		
Other metals		
Automobile batteries		
Oil		
Tires		
White goods/appliances		
Wood/lumber		
Bricks/concrete		
Other:		

* Source: NRAES-87, Home*A*Syst: An Environmental Risk-Assessment Guide for The Home

Action Checklist*

Managing Household Waste

Write all high and medium waste-making potentials and risks below?	What can you do to cut waste or reduce the risk?	Set a target date for action.
Sample: Products are purchased without considering whether the packaging is recyclable.	Find out about Lodi recycling program and try to buy products with packaging that can be recycled locally.	One week from today: May 19

* Source: NRAES-87, Home*A*Syst: An Environmental Risk-Assessment Guide for the Home.

Section 9: Special Considerations

This section of the handbook deals with situations that might affect some people in the watershed, but not the majority of people. For example, very few houses in San Joaquin County have basements. Few people in Lodi are likely to have underground or aboveground storage tanks for gasoline, diesel fuel, or heating oil. However, there are some people in the watershed who have such tanks on their property, or who have houses with basements. This section of the handbook will offer advice on how to safeguard your property and the watershed in these special circumstances.

This section of the handbook will offer helpful hints for the following special situations:

- Swimming pool and spa water
- Basements
- Riverfront property
- Lead-based paint
- Underground and aboveground storage tanks for gasoline, diesel fuel, heating oil, and other types of fuel.

While there may be relatively few homes in the watershed where these examples apply, potential threats from these circumstances to your property, the community, and the environment are so great that it is vital they be addressed in this handbook.

Please fill out any sections in the assessment on the next page that might apply to your home or property. They will help identify potential risks on your property from these special considerations. Then, read about ways to reduce threats at your home and in your community on the pages following these assessments. Note all medium and high risks on the checklist at the end of this section. Using the checklist and information contained in this section, you can formulate an action plan to reduce potential pollution.

Though only one or maybe none of the special considerations might apply to your property, it might be a good idea to read through this section for your own knowledge.

Special Considerations Assessment*

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Pools/Spas				
Emptying swimming pools and spas	I dechlorinate the water and use it to water lawns, gardens, and plants over a period of several days.	I dechlorinate the water and empty the water into the storm drain or surface water.	I don't dechlorinate the water before discharging it into a storm drain or surface water. (Note: This is illegal)	❑ Low ❑ Medium ❑ High
Basements				
Basement protection	Stormwater is diverted from basement windows by window well covers or other devices. Yard is sloped away from the foundation. Downspouts direct roof drainage away from the house.	No special water diversion methods are installed, but stormwater has never entered the basement.	No water diversion methods are attempted. Stormwater runoff has entered the basement or flows near the foundation.	❑ Low ❑ Medium ❑ High
Lead				
Age of home	Built after 1978.	Built between 1950 and 1978.	Built before 1950.	❑ Low ❑ Medium ❑ High
Interior paint	No lead-based paint (LBP).	LBP present but intact.	Defective LBP: it is chipping, peeling, or chalking; or paint disturbed by recent remodeling.	❑ Low ❑ Medium ❑ High
Windows and doors	No LBP, or windows and doors with lead based paint have been replaced.	LBP present but intact.	Defective LBP: it is chipping, peeling, or chalking; or untrained workers have recently removed the paint.	❑ Low ❑ Medium ❑ High

* Parts adapted with permission from NRAES-87: Home*A*Syst: An Environmental Risk-Assessment Guide for the Home.

Special Considerations Assessment *(continued)*

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Lead				
Water supply	No lead water pipes, leaded solder, or brass fixtures used in plumbing.	Lead present in plumbing, but water has been tested and precautions have been taken.	Lead likely to be present in plumbing, but water has not been tested and no precautions have been taken.	❑ Low ❑ Medium ❑ High
Water acidity or corrosiveness	Hardness is around 80 milligrams/liter pH = 7.5-8.5	Hardness is 60-80 milligrams/liter pH = 6-7.5	Hardness is below 60 milligrams/liter pH = less than 6	❑ Low ❑ Medium ❑ High
LBP on exterior of house	No LBP, or LBP is present but intact. There is a lawn or dense landscape plantings around the side of the home.	LBP is weathered or chalking. There is LBP in the soil around the home, but foot traffic is kept away.	LBP is chipping, peeling, or chalking. There is bare soil or foot traffic below painted walls.	❑ Low ❑ Medium ❑ High
Major roadways	There is no major roadway nearby.		There is a major roadway within 85 feet.	❑ Low ❑ High
Lead-related industry	No lead-related industry or incinerators in the area.		Lead smelter, battery manufacturer or recycler, or other lead-related industry nearby.	❑ Low ❑ High
Fuel Tanks				
Water table	The water table (distance to groundwater) is consistently more than 10 feet below the surface.	The water table is between 5 and 10 feet below the surface.	The water table is 5 feet or less below the surface.	❑ Low ❑ Medium ❑ High
Leak detection procedures	Tank is regularly tested for "tightness" and monthly fuel use accounting is done.	Monthly fuel use accounting is done.	No testing of fuel use is done.	❑ Low ❑ Medium ❑ High
Spill and overfill protection	Filling is closely supervised.		Filling is unattended.	❑ Low ❑ High
Tank containment (aboveground tanks)	Tank is on a containment pad/dike capable of holding 125% of the tank volume.	Tank is on an impervious surface without a berm or dike for containment.	Tank has no protection to contain major leaks and spills.	❑ Low ❑ Medium ❑ High

Special Considerations Assessment (*continued*)

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Fuel Tanks				
Tank security (for gas and diesel)	Tank or pump is surrounded by a 6 foot locked fence, plus there is a lock on the pump.	Fill hose is locked (required by law).	There is no fence or enclosure around the tank, and there are no locks.	❑ Low ❑ Medium ❑ High
Damage protection	Tanks and pumps are on stable concrete or steel supports. Tank is well-protected from damage by impact.		Tank is in contact with the ground or on poor footings. Tank is not well-shielded from impact.	❑ Low ❑ High
Inactive tanks	Inactive tanks have been removed.	Inactive tanks have been left in place, emptied, and filled with approved material.	Inactive tanks have been abandoned and left underground (or aboveground).	❑ Low ❑ Medium ❑ High
Inspection for contamination	Tank sites have been checked for signs of soil and groundwater contamination.		Tank sites have not been checked for signs of contamination.	❑ Low ❑ Medium ❑ High
River Frontage Property				
Nature of riverbank	There is at least a six foot buffer of riparian plants along the bank. There are no artificial bank strengthening materials (concrete rip rap, brick, wooden beams, etc.) and no signs of erosion or undercutting.	There is a small buffer of riparian plants and/or some artificial bank strengthening material. There are some signs of bank erosion and undercutting.	There is no buffer strip of riparian plants. Artificial bank strengthening material is leaning or falling in to the river, or there is severe undercutting, or I am losing property to the river.	o Low o Medium o High

Swimming Pools and Spas

Many people are fortunate to have a swimming pool or spa/hot tub. When performing maintenance on pool and spa structures or their filtering systems, it is sometimes necessary to drain them completely. Because chemicals are added to pool water, special care must be taken when they are drained. The law allows pool and spa water to be discharged into a storm drain, but only when certain conditions are met.

Pool and spa water can contain chlorine, copper, and *filter backwash* which can all be toxic to aquatic life. Chlorine is used in pools and spas to purify the water. But chlorine also kills bacteria, and is used to make insect and weed killers. Recommended chlorine levels for spas and swimming pools is between 2 and 4 ppm. Chlorine levels higher than 0.01 parts per million (ppm) are harmful to aquatic organisms, and exceeds the level allowed by the California Department of Fish and Game for discharge into surface water. So, before pool water can be sent to a storm drain, it must first be dechlorinated.

There are two common ways to dechlorinate water. First and easiest, you can just stop adding chlorine to your pool or spa and wait until the chlorine naturally dissipates. Or, the water can be treated with a chemical dechlorinator. Either way, use a pool testing kit to be sure the water is safe. But rather than send the dechlorinated water straight to the storm drain, consider using it to water lawns, gardens, and plants. It's a great way to conserve water.

Copper found in pool water can come from algae control products and from copper plumbing and equipment. This is especially true for spas or hot tubs with heaters. The recommended dosage for most algaecides is generally about 100 times higher than concentrations that are toxic to many aquatic organisms. The Environmental Protection Agency says copper levels in a pool greater than 0.10 ppm could be harmful to aquatic life. A pool maintenance company or pool supply store can test your water for copper, and recommend the best way to reduce or eliminate copper levels.

And once you do the work on your pool or spa, **never** discharge wastewater from acid washing, plastering, grouting, or filter backwash into the storm drain.

Maintaining the proper chemical balance of pool and spa water, and regularly cleaning and inspecting the pools filtration system will minimize the need to drain your pool or spa, and prevent unnecessary corrosion of copper pipes and equipment. It will also save you money in the long run by prolonging the life of your spa and pool equipment.

Riverfront Property

Residents fortunate enough to live along the Mokelumne River or one of its tributaries can have an even more direct effect on the quality of the river than others who live farther away. Although people who live miles away from river and stream banks can still improve water quality by addressing risks, people who live along the river can have a greater impact on what the river is or will become.

Start by looking at your property. Chances are, it slopes towards the river. That means runoff from rainfall and lawn watering will flow directly to the river. If you mow your lawn all the way to the riverbank, runoff (and the fertilizers, insecticides, and pet wastes it contains) has a greater chance of finding its way into the river. It might be even more important for you to consider "naturalizing" your yard with wetland, woodland, or other *riparian vegetation.*

One of the best ways to slow and filter runoff is to make sure there is a buffer strip of thick vegetation and trees along the waterfront. Roots from native trees and vegetation will help control erosion of your property by stabilizing and strengthening stream banks. This vegetation also provides habitat for wildlife such as birds and butterflies.

Trees and wetland plants also act as a sponge by helping to absorb floodwater, slowly releasing it over time. While buffer strips and riparian plants can't stop floodwaters from rising, they can slow down water flows and will reduce erosion damage compared to properties where the lawn is mowed to the riverbank. Get more information and ideas on ways to enhance your waterfront property from several sources. Contact the San Joaquin County Cooperative Extension Service, the Natural Resources Conservation Service, the San Joaquin County Resource Conservation District, or the East Bay Municipal Utilities District. See page 65 for contact information.

Basement Seepage and Flooding[11]

Stormwater in a basement can be a hazard in two ways: if water carries contaminants or disease organisms into your home; and if water picks up chemicals stored in your basement and carries them into the sewer or ground. To help prevent water from entering your basement, seal common stormwater entry points like basement doors and windows against leaks. It is best if window and door sills are at least a foot above the ground. Window wells that extend above ground level can help divert stormwater, and windows at or below ground level can be protected with clear plastic covers. Be sure to slope your yard away from the foundation to prevent water from pooling near the house and leaking into the basement.

---

[11] Collaborating authors Carl DuPoldt, Natural Resources Conservation Service and Carolyn Johnson, University of Wisconsin Cooperative Extension.

Installing a water treatment device such as a reverse osmosis system may be necessary for severe lead contamination.

If high levels of lead are found, there are some simple steps you can take to reduce your risk. For example, plant grass or cover soil with mulch to prevent your family from tracking soil indoors. It will also reduce the lead-contaminated dust your family will breathe. Also, use only cold tap water for cooking and drinking because hot water is more likely to dissolve lead.

Lead Outside The Home

Lead contaminated soil is a problem when children play outside, when soil is tracked inside the home, and when vegetables are grown in contaminated soil. Soil can be contaminated by flaking, peeling, or chalking LBP that follows the *drip line* of the house. Lead levels tend to be highest where house walls meet the ground. Leaded gasoline exhaust has been responsible for high levels of lead in soil in high auto traffic areas, with the highest levels recorded near major roadways. The shift to unleaded gasoline has reduced the risk, but lead levels can still be high even years after contamination.

If you live near industrial sources such as incinerators, lead smelters, or battery recyclers, you should be concerned about lead in your soil. Urban residents should consider having soil tested for lead before planting a vegetable garden. Testing the soil is the only way to detect a lead problem. Soils with lead levels of 400 ppm or more should not be used to grow vegetables unless the top 6 to 8 inches of soil is replaced with non-contaminated topsoil. Lead is usually found in the top 2 to 3 inches of undisturbed soil.

Under new standards, lead is considered a hazard if there are greater than 400 ppm of lead in soil in childrens' play areas, or 1200 ppm average for bare soil in the rest of the yard.

Soil lead levels within 85 feet of busy roadways are typically 30 to 2,000 ppm higher than natural levels. Some soils have lead levels as high as 10,000 ppm. Soil adjacent to houses with exterior LBP may also have lead levels as high as 10,000 ppm. Levels near industrial sources can be dangerously high, especially downwind. Rural residents who live near old orchards, or suburban dwellers who live in a subdivision built on an old orchard should also consider having soil tested. Some old orchards can have high lead levels due to lead-containing pesticides that were applied during the 1940's.

Aboveground or Underground Fuel Tanks[13]

It is vital to know about fuel storage tanks on your property, including both tanks now in use and those that have been abandoned. You are financially responsible for leaks from a tank on your property, even if you are unaware that the tank exists. Standard homeowners insurance does not typically cover the costly cleanups from a leaking tank.

The greater the distance between any tank and nearby drinking water wells or surface water, the better. The minimum distance allowed in San Joaquin County is 100 feet. Other factors do influence the risk related to distance. Tanks are safer when located downhill from wells. Sandy and gravelly soils that allow pollutants to seep more rapidly into groundwater are another factor.

Pipes, hoses, valves, and fittings connected to a tank can be a major source of leaks. They are often overlooked, especially if buried underground. Piping generally fails due to corrosion, accidents, and weather-related factors. Professional installation and inspection are the key to avoiding problems.

Leak Detection

Leak detection is more complicated for underground tanks, and critical for tanks over 15 years old. Set up a regular inspection schedule for leaks and damage to all tanks, including any heating oil tanks in your basement. One way to check for leaks is to monitor the level of fuel over time. Precisely measure and record the amount of fuel in your tank each month. Compare your records to the amount of fuel delivered and dispensed. Differences in your records could indicate a leak, but this method is not always accurate and small leaks can be missed. Underground heating fuel tanks dispense automatically when in use, and are best monitored during the summer.

Your senses are a vital part of leak detection. Warning signs include:

- Any unexplained oil-like substance on streams.
- Wet places near the tank.
- Soil near the tank is stained with petroleum.
- A strong and constant smell of petroleum near the tank.
- You or your neighbors smell fuel odors near plumbing or sewer line openings, or taste fuel in your drinking water.

Normally, you should be able to see leaks from an aboveground tank, but be aware of possible leaks in areas you can't easily see, such as any place the tank is in contact with the ground. Also be aware of unusual or changing operating conditions at the pump. If your suction pump rattles, the fuel flows unevenly, or if the pump hesitates too long before dispensing, your piping may be damaged or leaking.

[13] Collaborating authors Richard Castelnuovo, National Farm*A*Syst Office, Madison, Wisconsin and Dean Solomon, Michigan State University Extension.

Spill Protection

The most common—and most avoidable—cause of spills is overfilling. Close supervision of fuel transfer is one of your best forms of protection. Never walk away while filling a vehicle with fuel. Automatic shutoff devices are available to help prevent spills, but they're not suitable for every tank. Box-like containment structures for aboveground tanks can prevent leaks and spills from spreading. Containment measures should be able to keep the entire contents of a tank from escaping. It is best to construct a concrete dike and spill pad.

Aboveground tanks are also susceptible to damage from vehicles and other objects. Be sure tanks are placed on a solid, stable base or on footings made of brick, cinder block, or concrete. If the tank is not enclosed in a structure, be sure to install posts or other barriers around it. If you have a basement tank that holds household heating oil, be sure nothing is stored around or under the tank.

Abandoned Tanks and Tank Removal

Abandoned or inactive tanks are an environmental threat until they are removed. Sometimes leaks are discovered when a tank is removed. Soil around and under the tank should be inspected for obvious sign of leaking (odors, stains, or visible fuel). If you suspect contamination, a more thorough site assessment should be quickly arranged.

Whenever a leak is discovered, it should be immediately reported to local officials and state regulators. You are expected to minimize harm to the environment as soon as possible whenever a leak is detected. State funds may be available to help defer cleanup costs.

State Laws Governing Underground Fuel Storage Tanks

California laws covering underground fuel storage tanks have changed. All underground tanks are required to be double-walled and protected against corrosion. Piping and spill protection for these tanks must also be reinforced. There are new monitoring, reporting, and record-keeping requirements, and, specific requirements for spill containment. The changes are too numerous and varied depending on type of tank and fuel delivery system to all be included them in this handbook.

If you have specific questions or concerns about underground fuel storage tanks, contact with San Joaquin County Environmental Health Division at (209)-468-3420. Permits for tank installation, removal, and repair in San Joaquin County are available on the world wide web at: http://www.geocities.com/unitiii Information about state requirements and laws governing underground fuel storage tanks is also available on the world wide web from the State Water Resources Control Board at:
http://www.swrcb.ca.gov/cwphome/ust/usthmpg.htm

Action Checklist*

Special Considerations

Write all high and medium risks below.	What can you do to reduce the risk?	Set a target date for action.
Sample: No special stormwater diversion methods around basement.	Extend basement window wells 12 inches above the ground.	One week from today: April 18

* Source NRAES-87, Home*A*Syst: An Environmental Risk Assessment Guide for the Home

For More Information

Contact	Telephone Number	Website
Alternative Roofing plans		www.roofmeadow.com
California Conservation Dept.-Recycling Division	(916)-323-3836	www.consrv.ca.gov
California EPA-Toxics Help Desk	(916)-327-1848	www.calepa.ca.gov
California Health Services Dept.-Drinking Water and Environmental Management	(916)-322-2308	www.dhs.ca.gov/ps/ddwem/
California Pesticide Regulation Department-Environmental Monitoring and Pest Management	(916)-324-4100	www.cdpr.ca.gov
California Toxic Substances Control-Public Assistance	(916)-322-0476	www.dtsc.ca.gov
California Water Resources Control Board (CWRCB)	(916)-341-5250	www.swrcb.ca.gov
CWRCB-Nonpoint Section	(916)-341-5494	www.swrcb.ca.gov
CWRCB-Stormwater Programs	(916)-341-5529	www.swrcb.ca.gov
California Native Grass Association		www.cgna.org
California Native Plant Society	(916)-447-2677	www.cnps.org
Lodi Public Works Dept.-water/wastewater	(209)-333-6740	www.lodi.gov/html/pub_works.html
Lodi Public Works Dept.-Water Conservation Officer	(209)-333-6829	
Lodi Refuse and Trash Collection	(209)-369-8274	
Lodi Storm Drain Detectives		Link on bottom of Lodi public works page. www.lodi.gov/html/pub_works.html
Motor oil and filter recycling	(800)-253-2687	
San Joaquin County Cooperative Extension-Farm & Home Advisors	(209)-468-2085	http://cesanjoaquin.ucdavis.edu
San Joaquin County Public Works-Solid Waste	(209)-468-3066	www.co.san-joaquin.ca.us/pubworks
San Joaquin County Public Health Services-Environmental Health	(209)-468-3420	
San Joaquin County Resource Conservation District	(209)-946-6229 Ext. 130	www.sjcrcd.org
San Joaquin County Sewer and Water	(209)-468-3090	www.co.san-joaquin.ca.us/pubworks
United States Department of Agriculture-Natural Resource Conservation Service	(209)-946-6229	www.nrcs.usda.gov

Glossary of Terms

Bacteria – microscopic, one-celled organisms that can live in soil, water, air, or other organisms. Many kinds of bacteria are helpful and can be used to help break down garbage or sewage (as in septic systems). Harmful types of bacteria can cause disease in humans, animals, or plants.

Bedrock – solid rock, generally unbroken and covered by soil and rock fragments. Solid rock underneath soil or exposed at the surface. Depending on the type of rock that makes up bedrock, it could be porous or impermeable.

Benzene – a natural component of petroleum and petroleum-based products. Short-term exposure can cause dizziness, drowsiness, and/or nauseau. Can also result in irritation to eyes, skin, and longs. Prolonged exposure to benzene vapors can cause irregular heartbeat, stumbling, sleepiness, or even death. Cancer and/or blood disorders might result from repeated exposure.

Broadcast Spraying – a method for applying fertilizers or pesticides by scattering over a wide area. Not recommended, especially for home applications. Applied in this manner, fertilizers and pesticides are subject to wind drift and can miss intended target areas.

Chemical Reactions – when elements and compounds react together to produce different compounds. For example, when bleach and ammonia are mixed together, they form the toxic gas chloramine.

Compost – yard and food waste that has naturally broken down. An earthy smelling, soil-like substance that can be used as fertilizer or combined with soil to enrich it.

Compostables – items that can be used to make compost, including yard waste and some kitchen waste. Yard waste can include leaves, shredded branches, and grass clippings (though grass clippings should be left on the lawn). Kitchen waste suitable for composting includes vegetable and fruit scraps, coffee grounds, and eggshells. Never put meat scraps, fat, lard, bones, whole eggs, or pet waste into compost as these items draw pests and create a haven for harmful bacteria.

Corrosive – any chemical that causes a breakdown of materials. This breakdown can be either a chemical or physical interaction that changes the structure of a material and its physical properties. A typical corrosive is acid.

Drip Line – the area where stormwater runs off of a roof without gutters.

Enviro-shopping – purchasing products with the least amount of packaging, or buying in bulk if the food or items will not be wasted. When buying fertilizers, pesticides, paints, or other household hazardous products, purchasing only the quantity that will be used for a specific job at one time.

Filter backwash – water or other liquid that can be contaminated by chemicals or sediment contained in a filter, such as might be used for a spa, swimming pool, or septic system. Reverse water flow back through a filter to remove entrapped solids.

Garbage – food waste or wet food of either plant or animal origin.

Ground cover – low, herbaceous plants used for covering the ground in place of grass. They can be used to slow runoff and hold sediment, especially in sloped areas.

Integrated Pest Management (IPM) – a systematic, more environmentally friendly approach to controlling landscape pests (including weeds). Using natural predators (including beneficial insects and microorganisms) to control pest insects. Non-toxic or low-toxic chemicals are used selectively and sparingly, if chemicals are used at all.

MTBE (methyl tertiary butyl ether) – a synthetic chemical added to gasoline to improve air quality. However, this chemical has been placed on the Environmental Protection Agency's list of contaminants for soil, air, and drinking water.

Municipal Solid Waste – household waste, combined with commercial, business, and institutional waste.

Nitrates – compounds consisting of potassium nitrate or sodium nitrate. Generally found in fertilizers. Nitrates are a groundwater contaminant that can migrate into aquifers.

Non-point source pollution (NPS) – contaminants from unspecified locations. NPS comes from many different sources rather than one specific, identifiable location. For example, sediment, debris, and chemicals carried into the Mokelumne River via stormwater runoff from neighborhoods. (See also *point-source pollution*).

Nutrients – when referring to water pollution, generally considered plant nutrients. Nurients are natural or chemical substances that promote growth. In the context of this handbook, anything that promotes the growth of algae or bacteria. Sources of nutrients include sewage and septic runoff, detergents, industrial waste, fertilizer runoff, and livestock waste.

Pathogens – any disease-producing organisms.

Point-source pollution – contaminants that can be traced to a specific location or activity. For example, discharges from a manufacturing plant or a leaking fuel or chemical storage tank.

Post-consumer – when buying recycled goods, it means that all or part of the goods or packaging is made from materials that have been recycled by consumers like you.

Pre-cycling – Selecting products that last longer, use less natural resources, and produce a minimum of waste; or selecting products that have multiple uses, can be easily repaired when broken, or passed on to someone else.

Recyclables – materials like glass, plastic, paper, metal, or even appliances that are collected, separated, and processed back into raw materials and made into new products.

Reel mower – a type of lawn mower that uses human-power. When pushed, the mower's wheels provide the force that turns the blades to cut the grass. Using a reel mower reduces air and noise pollution while providing exercise for the user.

Reusables – any item that can be used several times for the same purpose. For example, reusable canvas shopping bags can eliminate the need for paper or plastic bags at grocery stores. These bags are often easier to carry, and are stronger and less susceptible to tearing or breaking.

Riparian vegetation – grasses, shrubs, and trees that grow along the bank of a river or other body of water. These plants are adapted to wet conditions, and perform the dual purposes of stabilizing streambanks to reduce erosion and sedimentation, and can help reduce damage from flooding by slowing the rate of water flow. They also serve as a filter for runoff by helping remove debris and contaminants.

Runoff – In the context of this handbook, rainwater not absorbed into the ground or rainwater that flows across property, roofs, driveways, sidewalks, and streets.

Sanitary sewer – the sewer that carries waste water from inside the home (for example, water from sinks, dishwashers, tubs, and toilets) to a sewage treatment plant for removal of soaps, solids, and other contaminants.

Solid waste stream – the total flow of solid waste from homes, businesses, institutions, and manufacturing plants that are recycled, burned, or disposed of in landfills.

Storm drain – any drain designed to carry rainwater or runoff out of a specific area. Storm drains are found in streets and parking lots. They convey water directly to a river or catch basin, not to a treatment plant. All contaminants picked up by stormwater as it flows across paved areas are deposited directly into the river.

Surface water – any water that is permanently or regularly on the earth's surface, such as a pond, lake, wetland, estuary, river, stream, or bay.

Total Dissolved Solids – a sum of the disintegrated organic and inorganic material in water. Excessive dissolved solids make water unfit to drink or use in industrial processes.

Trash – items and materials no longer wanted or used. Anything that is useless or worthless. Waste.

Waste – items and materials no longer wanted or used. Anything left over or superfluous. Trash

Watershed – the land area that contributes water to a specific surface water body.

Water soluble – capable of dissolving in water.

Water table – the level at which the soil is saturated with water.

Appendix D

2010 Lodi General Plan (Excerpts)

LODI GENERAL PLAN

CITY OF LODI | ADOPTED APRIL 7, 2010

City Council

Phil Katzakian, ***Mayor***

Larry D. Hansen

Susan Hitchcock

Bob Johnson

JoAnne Mounce

Planning Commission

Bill Cummins, ***Chair***

Randall Heinitz

Steven Hennecke

Dave Kirsten

Wendel Kiser

Tim Mattheis

Debbie Olson

Project Staff

Blair King, ***City Manager***

Konradt Bartlam, ***Interim Community Development Director***

Support Staff

Wally Sandelin, ***Public Works Director***

James M. Rodems, ***Interim Parks and Recreation Director***

Stormwater

Discharge System

The City's stormwater system consists of catch basin inlets, storm drain pipes, detention basins, gravity outfalls into the Mokelumne River, and pump stations with outfalls to the Mokelumne River and the WID canal. There are about 110 miles of storm drains, eight detention basins located in City parks, and 14 pump stations. The City's existing system functions well, with no significant flooding problems. Like many other relatively flat, Central Valley communities, however, there are areas of minor drainage nuisances.[8]

WID Discharges

The city's stormwater discharges to the WID canal are governed by the Storm Drainage Discharge Agreement between the City and WID, dated October 20, 1993.[9] The 40-year agreement covers the area defined as the City's corporate boundaries, with an ultimate boundary including 16,800 acres. The agreement recognizes that the WID canals are for irrigation purposes and for groundwater recharge. Under the terms of the agreement the discharges from the City's pump stations must be regulated to avoid exceeding the available capacity of the canal and interfering with WID operations. The total discharge into the canal from the City is limited to 160 cubic feet per second (cfs), which is 40% of the canal's conveyance capacity of 400 cfs. Additional requirements exist for specific timing and types of discharges.

The agreement also allows the City to purchase water from WID for non-potable water uses, as long as the annual quantity of purchased water does not exceed the average annual storm drain discharge. The water is available for purchase only if WID has satisfied its irrigation demands and has the ability to deliver the water. Therefore, although the purchase of non-potable water is mentioned in the agreement, City staff must verify with WID whether water is likely to be available. Finally, the agreement requires the City to take reasonable precautions to prevent/remove toxic substances, pollutants, and wastes before discharging flow into the WID canal. Ongoing communication between the City and WID will be an important component of continuing the existing relationship.

Planned Stormwater System

The stormwater plan for the reasonable development of the General Plan includes the division of the City's growth areas into 16 drainage watersheds. The watershed boundaries shown on Figure 3-3. For each of these watershed areas, the tributary trunk drain, detention basin, discharge rate (gravity flow or pump station), and outfall pipeline have been preliminarily sized. These facilities are briefly described in Table 3-6, though facility planning and sizing will need to be refined and verified though preparation of a detailed stormwater master plan. Additional storm drain collection systems would also be required and should be considered in the citywide storm drain master plan.

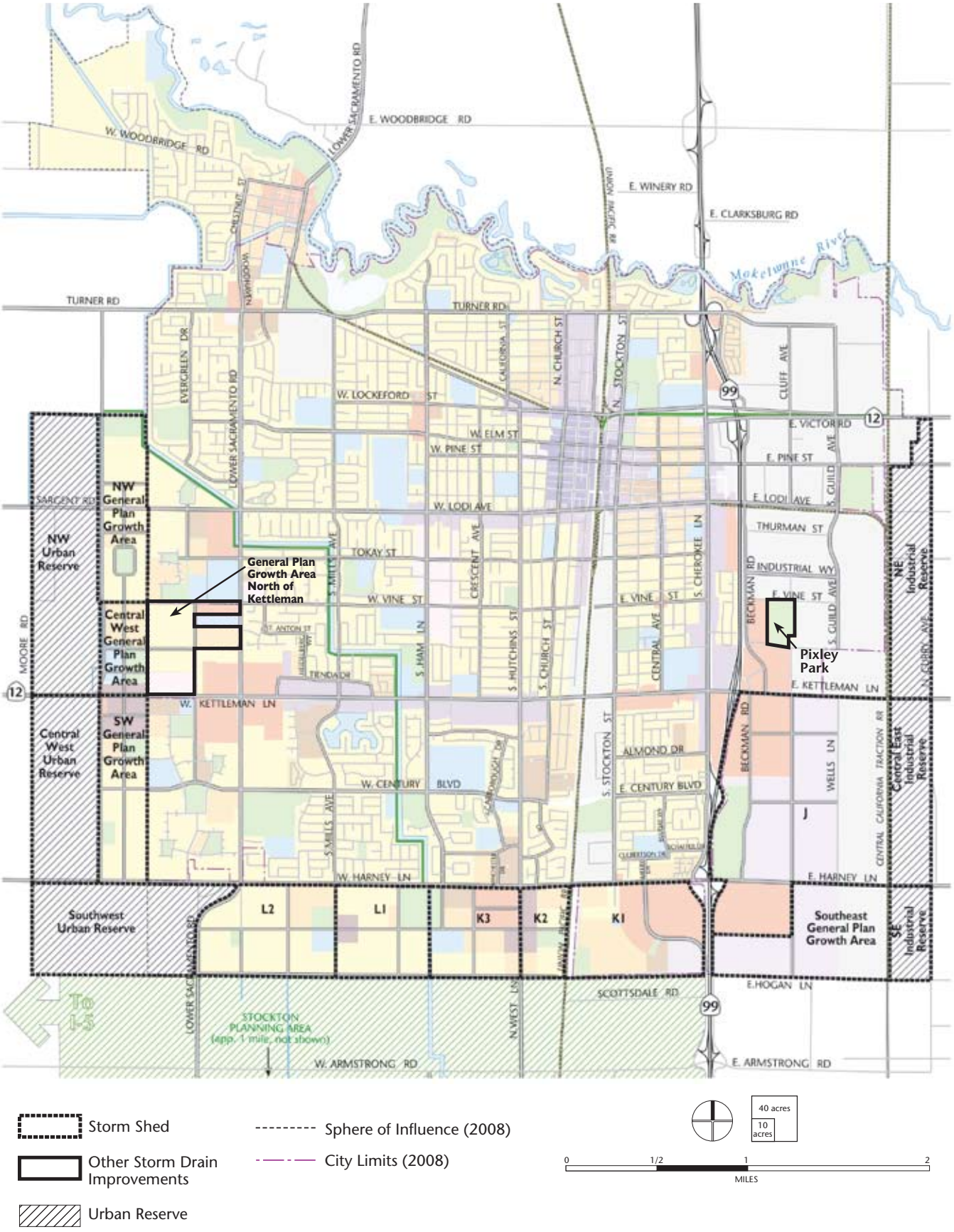
Stormwater Quality

The City of Lodi has two documents that address stormwater quality, the City of Lodi Stormwater Management Program[10] and the City of Lodi Stormwater Development Standards Plan.[11] The Stormwater Development Standards Plan identifies the water quality Best Management Practices (BMPs) required for all new development and significant redevelopment activities within the City. It identifies specific BMPs for the three drainage zones in the City, which include drainage to the Mokelumne River, drainage to the WID canal, and drainage to a retention basin with no discharge, as well as BMP's appropriate for specific types of industries and businesses. Compliance with the requirements of these documents protects the quality of the City's urban runoff, and ultimately protects the quality of the Mokelumne River and WID canal.

Some of these BMPs should be considered for implementation in conjunction with the storm drainage detention basins described in Table 3-6. For example, the release structures from the basins could be designed to allow

[8] Prima, 2007.
[9] Woodbridge Irrigation District, 2003.
[10] Black & Veatch, City of Lodi Stormwater Management Program, January 2003.
[11] City of Lodi Stormwater Development Standards Plan, May 2008.

FIGURE 3-3: PROPOSED STORM DRAIN FACILITIES



Storm Shed

Other Storm Drain Improvements

Urban Reserve

Sphere of Influence (2008)

City Limits (2008)

40 acres

10 acres

0 1/2 1 2

MILES

the bottom two to three feet of the basins to function as extended detention basins. Another approach would be to design detention basins to include water quality wet ponds or constructed wetlands within the bottom of the stormwater detention basins. These facilities can also help recharge the underlying groundwater.

Infiltration trenches and infiltration basins could also be constructed within the pond bottoms to treat and infiltrate the more highly polluted first flush of runoff and the highly polluted dry weather runoff (e.g. from car washing on streets and driveways). These facilities could completely eliminate the discharge of the most polluted flows to the Mokelumne River and the WID canal, and help recharge the underlying groundwater.

Utility Master Plans

At an appropriate time in the future, utility master plans should be prepared for each of the services discussed above, including water, sewer, WSWPCF, recycled water, and stormwater. The appropriate timing of these master plans varies by the utility.

Potable Water Supply and Distribution

Significant modeling and facilities planning/design has occurred recently for the City's water system, and a new master plan is not urgently needed.

Sanitary Sewer System

City staff have sized and planned a South Wastewater Trunk Line along the south boundary of the City to convey wastewater from the east side of the City to the sewer outfall from the City to the WSWPCF. However, the trunk sewer sizing did not account for all of the growth on the east side of the City or redevelopment within the City identified in this general plan update. Consequently, the sizing of the trunk sewer may have to be revised. Currently, only one segment of the trunk sewer has been constructed. City staff has a current sewer model of the collection system that could be used to definitively evaluate how to best provide sewer service for the growth on the east side of the city and the redevelopment within the existing city. This work should be undertaken soon (before more segments of the trunk sewer are constructed) in case additional wastewater flows need to be diverted into the proposed South Wastewater Trunk Line.

WSWPCF

The WSWPCF has recently been expanded and should have adequate capacity through the early stages of Phase 1. Updating the WSWPCF master plan could be delayed until this time.

Recycled Water

A recycled water master plan was prepared in May 2008 and is still current. It may be appropriate to update this document when the next WSWPCF master plan is prepared. The updated recycled water master plan should also:

- Evaluate the potential to use nonpotable water from the WID canal.
- Evaluate the feasibility of constructing a scalping plant or recycled water processing treatment facility near the city to provide recycled water for use within the city. This would reduce the wastewater flow requiring treatment at the WSWPCF. It would also eliminate the need for a pipeline from the WSWPCF back to the city to deliver recycled water for use within the city.

Stormwater

The last citywide storm drain master plan was prepared in 1963, but stormwater facilities for the growth along the southern area of the city were evaluated in March 2009. It is recommended that a new citywide stormwater master plan be prepared soon after General Plan adoption to confirm or revise existing planning studies.

Preparation of these utility master plans at the appropriate times is the first step in enabling the City to provide these services for the General Plan growth. Through these master plans the facilities required for water, sewer, wastewater treatment, recycled water, and stormwater services for the reasonable development of the General Plan will be more precisely identified.

- A "Merit District" recognizes a district's history but does not provide for a regulatory structure at this time. The structures of these districts may not be architecturally significant, but the role that these neighborhoods have played in the city's development, the cultural and economic conditions that resulted in the construction of these neighborhoods and the stories surrounding them make them an important part of the city's history for which they should be acknowledged and celebrated.

C-P24 Follow preservation standards outlined in the current *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings*, for structures listed on the National Register of Historic Places or California Register of Historical Resources.

C-P25 Coordinate historic preservation efforts with other agencies and organizations, including the Lodi Historical Society, San Joaquin County Historical Society and other historical organizations.

Hydrology and Water Quality

See Chapter 3: Growth Management and Chapter 6: Parks, Recreation, and Open Space for water-related policies that address water supply and conservation; and riparian areas within open spaces, respectively.

C-P26 Monitor water quality regularly to ensure that safe drinking water standards are met and maintained in accordance with State and EPA regulations and take necessary measures to prevent contamination. Comply with the requirements of the Clean Water Act with the intent of minimizing the discharge of pollutants to surface waters.

C-P27 Monitor the water quality of the Mokelumne River and Lodi Lake, in coordination with San Joaquin County, to determine when the coliform bacterial standard for contact recreation and the maximum concentration levels of priority pollutants, established by the California Department of Health Services, are exceeded. Monitor the presence of pollutants and variables that could cause harm to fish, wildlife, and plant species in the Mokelumne River and Lodi Lake. Post signs at areas used by water recreationists warning users of health risks whenever the coliform bacteria standard for contact recreation is exceeded. Require new industrial development to not adversely affect water quality in the Mokelumne River or in the area's groundwater basin. Control use of potential water contaminants through inventorying hazardous materials used in City and industrial operations.

C-P28 Regularly monitor water quality in municipal wells for evidence of contamination from dibromochloropropane (DBCP), saltwater intrusion, and other toxic substances that could pose a health hazard to the domestic water supply. Close or treat municipal wells that exceed the action level for DBCP.

C-P29 Minimize storm sewer pollution of the Mokelumne River and other waterways by maintaining an effective street sweeping and cleaning program.

C-P30 Require, as part of watershed drainage plans, Best Management Practices, to reduce pollutants to the maximum extent practicable.

C-P31 Require all new development and redevelopment projects to comply with the post-construction Best Management Practices (BMPs) called for in the Stormwater Quality Control Criteria Plan, as outlined in the City's Phase 1 Stormwater NPDES permit issued by the California Water Quality Control Board, Central Valley Region. Require that owners, developers, and/or successors-in-interest to establish a maintenance entity acceptable to the City to provide funding for the operation, maintenance, and replacement costs of all post-construction BMPs.

C-P32 Require, as part of the City's Storm Water NPDES Permit and ordinances, the

implementation of a Grading Plan, Erosion Control Plan, and Pollution Prevention Plan during the construction of any new development and redevelopment projects, to the maximum extent feasible.

C-P33 Require use of stormwater management techniques to improve water quality and reduce impact on municipal water treatment facilities.

C-P34 Protect groundwater resources by working with the county to prevent septic systems in unincorporated portions of the county that are in the General Plan Land Use Diagram, on parcels less than two acres.

C-P35 Reduce the use of pesticides, insecticides, herbicides, or other toxic chemical substances by households and farmers by providing education and incentives.

Energy and Climate Change

C-P36 Prepare and adopt a comprehensive climate action plan (CAP) by 2012, with implementation beginning in 2013. The CAP will be an additional policy document for the City of Lodi, based on polices listed in Appendix A. The CAP should include the following provisions:

- An inventory of citywide greenhouse gas emissions;
- Emissions targets that apply at reasonable intervals through the life of the CAP;
- Enforceable greenhouse gas emissions control measures;
- A monitoring and reporting program to ensure targets are met; and
- Mechanisms to allow for revision of the CAP, as necessary.

C-P37 Promote incorporation of energy conservation and weatherization features into existing structures. Update the Zoning Ordinance and make local amendments to the California Building Code, as needed, to allow for the implementation of green building, green construction, and energy efficiency measures.

C-P38 Encourage the development of energy efficient buildings and communities. All new development, including major rehabilitation, renovation, and redevelopment projects, shall incorporate energy conservation and green building practices to the maximum extent feasible and as appropriate to the project proposed. Such practices include, but are not limited to: building orientation and shading, landscaping, and the use of active and passive solar heating and water systems. The City may implement this policy by adopting and enforcing a Green Building Ordinance.

C-P39 Ensure environmentally responsible municipal operations by implementing the following measures:

- Procure environmentally preferable products and services where criteria have been established by governmental or other widely recognized authorities (e.g. Energy Star, EPA Eco Purchasing Guidelines).
- Integrate environmental factors into the City's buying decisions where external authorities have not established criteria, such as by replacing disposables with reusables or recyclables, taking into account life cycle costs and benefits, and evaluating, as appropriate, the environmental performance of vendors in providing products and services;
- Raise staff awareness on the environmental issues affecting procurement by providing relevant information and training;
- Encourage suppliers and contractors to offer environmentally preferable products and services at competitive prices;
- Require all departments and divisions to practice waste prevention and recycling.
- When City fleet vehicles are retired, replace vehicles through the purchase or lease of alternative fuel or hybrid substitutes.

As contracts for City-contracted fleet services (such as transit buses, trash haulers, and street sweeper trucks) are renewed, encourage contractors to replace their vehicles with alternative fuel or hybrid substitutes through the contract bid process.

Appendix E

The Mokelumne Current

THE Mokelumne Current

Non-point source pollution

Do you pollute without realizing it?

By Ryan Ozminkowski
LODI HIGH SCHOOL

A couple enjoys the beautiful view of Lodi Lake while sharing a watermelon on a cool spring day. An athlete turns on her faucet when she gets home from an exhausting practice, excited for the refreshingly clean liquid that is about to pour out. An elderly fellow comfortably sits next to the Mokelumne River, waiting to catch that perfect fish.

Meanwhile, an old truck leaks oil in the parking lot of a Lodi shopping center. A lawn is over-fertilized in Park West. A maintenance team cleaning up a lawn blows leaves into Turner Road.

Simply put, if the latter keeps happening, then the former will cease to exist due to a problem known as non-point source pollution.

Non-point source pollution (NPS) is the technical term used to describe a plethora of pollutants that don't come from a single source. The EPA's website explains this phenomenon well by describing how after a rainfall, " ... the runoff moves ... picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and even our underground sources of drinking water." These pollutants can be yard trimmings, excessive fertilizers, pesticides, animal waste, or a litany of other pollutants. What people need to realize is that anything that ends up in our streets or on our sidewalks ends up in our water system.

For those living in the Lodi area, the water system that the pollutants drain to is the Mokelumne River and Lodi Lake. The Lodi Lake area is enjoyed by so many local residents that it would be an absolute shame if anything were to happen to its beauty. Kids swim in the lake, nature enthusiasts look for wildlife, and a third of the city of Lodi gets its water from there.

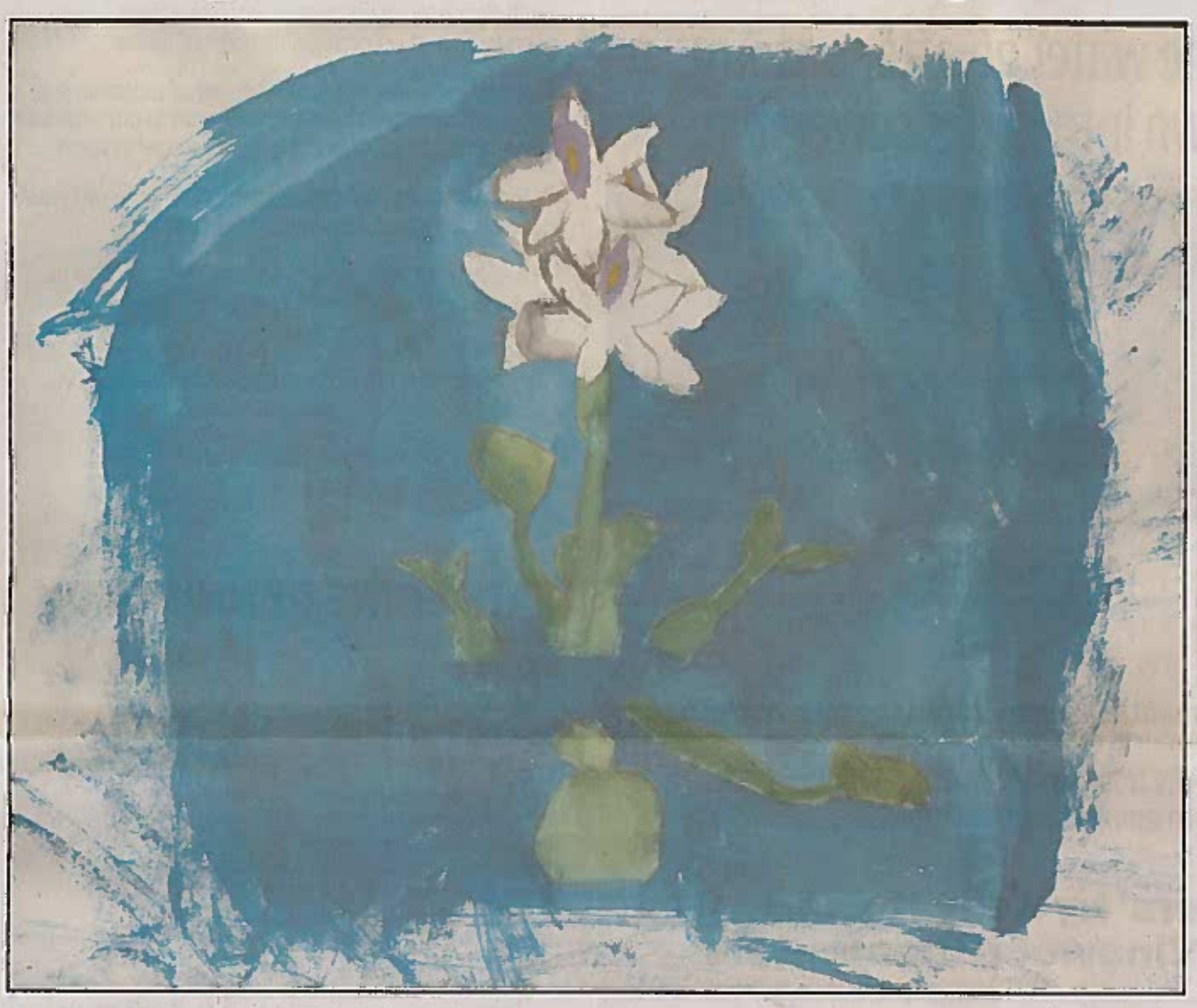
On top of this, Lodi Lake is also used for numerous athletic events.

"Lodi Lake is one of the great cross-country venues in Northern California," says Lodi High's cross-country coach Gregory Wright. "It is a picturesque and fast course. It is also a great course for spectators."

The reason it is so beautiful and a landmark for this region can be attributed to the City of Lodi and the effort it puts in to keeping the area clean.

PLEASE SEE POLLUTION, PAGE 2

Getting smarter about water hyacinth



Andrea Cobos, Lodi Middle School.

Five facts about the plant

1) The oldest living water hyacinth is 12 years old and the oldest flower was 9 years old.

2) A single plant can produce up to 5,000 seeds. That's why they populate so fast.

3) In Florida, it only took 70 years for local water ways to be filled with 126,000 hyacinth.

4) This plant can also be found in New York, Kentucky, Tennessee and finally California and Arizona.

5) The way water hyacinths spread is when people pull the plant out of the water and it drops seeds in in the water

Jay Bell plans to fly kites, go kayaking and see more nature

Lodi Unified curriculum specialist and Lodi Lake docent will retire this year

VINEWOOD ELEMENTARY SCHOOL STUDENTS

Jay Bell is a science curriculum specialist for the Lodi Unified School District and a docent for the Lodi Lake Nature Area. He is retiring this year.

He was interviewed by the classes of Kim Hutson and Kirk Rossi at Vinewood Elementary School.

Q: What were you like in elementary school?

A: Well, I don't think I was a really great student. I had attention deficit disorder, and it was hard for me to stay interested and pay attention in school. With some help from teachers, I was moved to the front of the class to help me stay focused.

Q: What did your teachers think of you as a student?

A: A few of my teachers weren't very fond of me or didn't pay much attention to me. I wasn't the kind of kid who got into trouble or hung out with the wrong crowd. I was quiet and not that active, although I loved being in nature, and I still do.

Q: What's the most important thing about growing up?

A: I believe the most important thing about growing up is to think carefully about the decisions you make.

Q: Who would you want to interview?

A: I would love to meet Albert Einstein. I honestly think he's a really interesting guy. I wouldn't care really about the interview. I think it would just be nice to sit down and have a cup of coffee with him.

Q: What are your talents?

A: I think my best talent is having the ability to speak to people of all ages. I can talk to children of all ages without having to talk like a

PLEASE SEE JAY BELL, PAGE 5

Catherine Pennington talks about what has changed in her years as an educator

Lodi Unified assistant superintendent will retire after nearly 40 years with district

By Miguel Arias and Aisha Khan
HERITAGE ELEMENTARY SCHOOL

Catherine Pennington is Lodi Unified School District's assistant superintendent of elementary instruc-

From 3 to 5 p.m. May 20, a retirement party will be held in Ms. Pennington's honor at the Lodi

Appendix F

The Basin Plan

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

RESOLUTION NO. R5-2002-0150

AMENDING THE WATER QUALITY CONTROL PLAN
FOR
THE SACRAMENTO RIVER AND SAN JOAQUIN RIVER BASINS
TO UPDATE THE WATER QUALITY OBJECTIVES FOR BACTERIA

WHEREAS, in 1975 the California Regional Water Quality Control Board, Central Valley Region (hereafter Regional Board) adopted the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Basin Plan), which has been amended occasionally; and

WHEREAS, the Federal Clean Water Act (CWA) Section 303 requires the Regional Board to develop water quality objectives which are sufficient to protect beneficial uses designated for each water body found within its region; and

WHEREAS, the CWA Section 303 requires the Regional Board to review the Basin Plan at least every three years and where appropriate modify water quality objectives or beneficial uses in the Basin Plan; and

WHEREAS, the current Basin Plan contains water quality objectives for total and fecal coliform bacteria to protect waters designated for water contact recreation based on recommendations made by the U.S. Environmental Protection Agency (USEPA) in 1976; and

WHEREAS, in 1986 the USEPA revised its recommended bacteria criteria for water contact recreation to include enterococcus for marine waters and enterococcus or e. coli for fresh waters; and

WHEREAS, in March 1999, the USEPA made a commitment in its Action Plan for Beaches and Recreational Waters that "where a State does not amend its water quality standards to include the 1986 criteria, USEPA will act under Section 303(c) of the Clean Water Act to promulgate the criteria with the goal of assuring that the 1986 criteria apply in all states no later than 2003;" and

WHEREAS, the USEPA's 1986 bacteria criteria represent the best science available; and

WHEREAS, the USEPA's 1986 bacteria criteria is intended to be equivalently protective of the water contact beneficial use as the current water quality objectives; and

WHEREAS, the amendment will revise Chapter III "Water Quality Objectives" of the Basin Plan to update the current water quality objectives for bacteria for water

contact recreation by replacing the fecal coliform indicator organism with the e. coli indicator organism; and

WHEREAS, the Regional Board has considered the costs of implementing the proposed amendment, and finds these costs to be a reasonable burden relative to the environmental benefits; and

WHEREAS, the proposed amendment is consistent with State Board Resolution No. 68-16 (*Statement of Policy with Respect to Maintaining High Quality of Waters in California*), the State's "Antidegradation Policy," in that the changes to water quality objectives (i) consider maximum benefits to the people of the state, (ii) will not unreasonably affect present and anticipated beneficial use of waters, and (iii) will not result in water quality less than that prescribed in policies. Likewise, the amendment is consistent with the federal Antidegradation Policy (Title 40 Code of Federal Regulations (40 CFR) Section 131.12); and

WHEREAS, the regulatory action proposed meets the "Necessity" standard of the Administrative Procedures Act, Government Code, section 11353, subdivision (b); and

WHEREAS, the basin planning process has been certified as "functionally equivalent" to the California Environmental Quality Act requirements for preparing environmental documents as specified in Title 23 California Code of Regulations (23 CCR) Section 3782 and is, therefore, exempt from those requirements (Public Resources Code, Section 21000 et seq.); and

WHEREAS, Regional Board staff has prepared a draft amendment and a staff report dated May 2002; and

WHEREAS, the Notice of Filing and environmental checklist indicates that the amendment results in no potential for adverse effect, either individually or cumulatively, on wildlife; and

WHEREAS, the draft amendment, staff report, Notice of Filing, and environmental checklist have been prepared, noticed and circulated to interested individuals and public agencies for review and comment in accordance with state and federal environmental regulations (23 CCR Section 3775, 40 CFR 25, and 40 CFR 131); and

WHEREAS, the Regional Board held a public hearing on 19 July 2002, for the purpose of receiving testimony on the draft Basin Plan amendment. Notice of the public hearing was sent to all interested persons and published in accordance with California Water Code, section 13244; and

WHEREAS, the Regional Board determined that additional time was needed for Board member review of the comments and proposed response to comments, so the hearing was closed to further testimony and the item was continued to 6 September 2002; and

WHEREAS, a Basin Plan amendment must be approved by the State Board, Office of Administrative Law (OAL), and USEPA before becoming effective; and

WHEREAS, the Regional Board finds that the proposed amendment to the Basin Plan was developed in accordance with California Water Code Section 13240, et seq.:

THERFORE BE IT RESOLVED, pursuant to Section 13240, et seq. of the California Water Code, the Regional Board, after considering the entire record, including oral testimony at the hearing, hereby approves the staff report and adopts the amendment to the Basin Plan as set forth in Attachment 1; and be it further

RESOLVED, that the Executive Officer is directed to forward copies of the Basin Plan amendment to the State Board in accordance with the requirements of Section 13245 of the California Water Code; and be it further

RESOLVED, that the Regional Board requests that the State Board approve the Basin Plan amendment in accordance with the requirements of Sections 13245 and 13246 of the California Water Code and forward it to OAL and the USEPA; and be it further

RESOLVED, if during its approval process the State Board or OAL determines that minor, non-substantive corrections to the language of the amendment are needed for clarity or consistency, the Executive Officer may make such changes, and shall inform the Regional Board of any such changes; and be it further

RESOLVED, the Executive Officer is authorized to sign a Certificate of Fee Exemption and following approval of the Basin Plan amendment by the USEPA submit this Certificate in lieu of payment of the Department of Fish and Game filing fee to the Secretary for Resources; and be it further

RESOLVED, the environmental documents prepared by Regional Board staff pursuant to Public Resources Code Section 21080.5 are hereby certified and, following approval of the Basin Plan amendment by the State Board, the Executive Officer shall file a Notice of Decision with the State Clearinghouse.

I, THOMAS R. PINKOS, Acting Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of a Resolution adopted by the California Regional Water Quality Control Board, Central Valley Region, on 6 September 2002.

/s/

THOMAS R. PINKOS, Acting Executive Officer

ATTACHMENT 1
RESOLUTION NO. R5-2002-0150
AMENDMENT TO UPDATE THE BASIN PLAN
TO UPDATE THE WATER QUALITY OBJECTIVES FOR BACTERIA

Revise Chapter 3, "Water Quality Objectives" by replacing the paragraphs under the bacteria water quality objective with the following:

~~*In waters designated for contact recreation (REC-1), the fecal coliform concentration based on a minimum of not less than five samples for any 30-day period shall not exceed a geometric mean of 200/100 ml, nor shall more than ten percent of the total number of samples taken during any 30-day period exceed 400/100 ml.*~~

In all waters designated for contact recreation (REC-1), the E. coli concentration, based on a minimum of not less than five samples equally spaced over a 30-day period, shall not exceed a geometric mean of 126/100 ml and shall not exceed 235/100 ml in any single sample.

If any single sample limits are exceeded for E. coli, the Regional Water Board may require repeat sampling on a daily basis until the sample falls below the single sample limit or for 5 days, whichever is less, in order to determine the persistence of the exceedance.

When repeat sampling is required because of an exceedance of any one single sample limit, values from all samples collected during that 30-day period will be used to calculate the geometric mean.

*In addition, f*or Folsom Lake (50), the fecal coliform concentration based on a minimum of not less than five samples for any 30-day period, shall not exceed a geometric mean of 100/100 ml, nor shall more than ten percent of the total number of samples taken during any 30-day period exceed 200/100 ml.

Appendix G

National and Statewide Maximum Contaminant Levels

G-1

Statewide Maximum Contaminant Levels

MCLs, DLRs, and PHGs for Regulated Drinking Water Contaminants

(Units are in milligrams per liter (mg/L), unless otherwise noted.)

Last Update: February 27, 2015

This table includes:

California's maximum contaminant levels (MCLs)

Detection limits for purposes of reporting (DLRs)

Public health goals (PHGs) from the Office of Environmental Health Hazard Assessment (OEHHA)

Also, PHGs for NDMA and 1,2,3-Trichloropropane (which are not yet regulated) are included at the bottom of this table.

	MCL	DLR	PHG	Date of PHG
Chemicals with MCLs in 22 CCR §64431—Inorganic Chemicals				
Aluminum	1	0.05	0.6	2001
Antimony	0.006	0.006	0.02	1997
Antimony	--	--	0.0007	2009 draft
Arsenic	0.010	0.002	0.000004	2004
Asbestos (MFL = million fibers per liter; for fibers >10 microns long)	7 MFL	0.2 MFL	7 MFL	2003
Barium	1	0.1	2	2003
Beryllium	0.004	0.001	0.001	2003
Cadmium	0.005	0.001	0.00004	2006
Chromium, Total - OEHHA withdrew the 0.0025-mg/L PHG	0.05	0.01	withdrawn Nov. 2001	1999
Chromium, Hexavalent - MCL effective July 1, 2014	0.010	0.001	0.00002	2011
Cyanide	0.15	0.1	0.15	1997
Fluoride	2	0.1	1	1997
Mercury (inorganic)	0.002	0.001	0.0012	1999 (rev2005)*
Nickel	0.1	0.01	0.012	2001
Nitrate (as NO3)	45	2	45	1997
Nitrite (as N)	1 as N	0.4	1 as N	1997
Nitrate + Nitrite	10 as N	--	10 as N	1997
Perchlorate	0.006	0.004	0.001	2015
Selenium	0.05	0.005	0.03	2010
Thallium	0.002	0.001	0.0001	1999 (rev2004)
Copper and Lead, 22 CCR §64672.3				
Values referred to as MCLs for lead and copper are not actually MCLs; instead, they are called "Action Levels" under the lead and copper rule				
Copper	1.3	0.05	0.3	2008
Lead	0.015	0.005	0.0002	2009
Radionuclides with MCLs in 22 CCR §64441 and §64443—Radioactivity				

[units are picocuries per liter (pCi/L), unless otherwise stated; n/a = not applicable]				
Gross alpha particle activity - OEHHA concluded in 2003 that a PHG was not practical	15	3	none	n/a
Gross beta particle activity - OEHHA concluded in 2003 that a PHG was not practical	4 mrem/yr	4	none	n/a
Radium-226	--	1	0.05	2006
Radium-228	--	1	0.019	2006
Radium-226 + Radium-228	5	--	--	--
Strontium-90	8	2	0.35	2006
Tritium	20,000	1,000	400	2006
Uranium	20	1	0.43	2001
Chemicals with MCLs in 22 CCR §64444—Organic Chemicals				
(a) Volatile Organic Chemicals (VOCs)				
Benzene	0.001	0.0005	0.00015	2001
Carbon tetrachloride	0.0005	0.0005	0.0001	2000
1,2-Dichlorobenzene	0.6	0.0005	0.6	1997 (rev2009)
1,4-Dichlorobenzene (p-DCB)	0.005	0.0005	0.006	1997
1,1-Dichloroethane (1,1-DCA)	0.005	0.0005	0.003	2003
1,2-Dichloroethane (1,2-DCA)	0.0005	0.0005	0.0004	1999 (rev2005)
1,1-Dichloroethylene (1,1-DCE)	0.006	0.0005	0.01	1999
cis-1,2-Dichloroethylene	0.006	0.0005	0.1	2006
trans-1,2-Dichloroethylene	0.01	0.0005	0.06	2006
Dichloromethane (Methylene chloride)	0.005	0.0005	0.004	2000
1,2-Dichloropropane	0.005	0.0005	0.0005	1999
1,3-Dichloropropene	0.0005	0.0005	0.0002	1999 (rev2006)
Ethylbenzene	0.3	0.0005	0.3	1997
Methyl tertiary butyl ether (MTBE)	0.013	0.003	0.013	1999
Monochlorobenzene	0.07	0.0005	0.07	2014
Styrene	0.1	0.0005	0.0005	2010
1,1,2,2-Tetrachloroethane	0.001	0.0005	0.0001	2003
Tetrachloroethylene (PCE)	0.005	0.0005	0.00006	2001
Toluene	0.15	0.0005	0.15	1999
1,2,4-Trichlorobenzene	0.005	0.0005	0.005	1999
1,1,1-Trichloroethane (1,1,1-TCA)	0.2	0.0005	1	2006
1,1,2-Trichloroethane (1,1,2-TCA)	0.005	0.0005	0.0003	2006
Trichloroethylene (TCE)	0.005	0.0005	0.0017	2009
Trichlorofluoromethane (Freon 11)	0.15	0.005	1.3	2014
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113)	1.2	0.01	4	1997 (rev2011)
Vinyl chloride	0.0005	0.0005	0.00005	2000
Xylenes	1.75	0.0005	1.8	1997
(b) Non-Volatile Synthetic Organic Chemicals (SOCs)				
Alachlor	0.002	0.001	0.004	1997

Atrazine	0.001	0.0005	0.00015	1999
Bentazon	0.018	0.002	0.2	1999 (rev2009)
Benzo(a)pyrene	0.0002	0.0001	0.000007	2010
Carbofuran	0.018	0.005	0.0017	2000
Chlordane	0.0001	0.0001	0.00003	1997 (rev2006)
Dalapon	0.2	0.01	0.79	1997 (rev2009)
1,2-Dibromo-3-chloropropane (DBCP)	0.0002	0.00001	0.0000017	1999
2,4-Dichlorophenoxyacetic acid (2,4-D)	0.07	0.01	0.02	2009
Di(2-ethylhexyl)adipate	0.4	0.005	0.2	2003
Di(2-ethylhexyl)phthalate (DEHP)	0.004	0.003	0.012	1997
Dinoseb	0.007	0.002	0.014	1997 (rev2010)
Diquat	0.02	0.004	0.015	2000
Endrin	0.002	0.0001	0.0018	1999 (rev2008)
Endothal	0.1	0.045	0.094	2014
Ethylene dibromide (EDB)	0.00005	0.00002	0.00001	2003
Glyphosate	0.7	0.025	0.9	2007
Heptachlor	0.00001	0.00001	0.000008	1999
Heptachlor epoxide	0.00001	0.00001	0.000006	1999
Hexachlorobenzene	0.001	0.0005	0.00003	2003
Hexachlorocyclopentadiene	0.05	0.001	0.002	2014
Lindane	0.0002	0.0002	0.000032	1999 (rev2005)
Methoxychlor	0.03	0.01	0.00009	2010
Molinate	0.02	0.002	0.001	2008
Oxamyl	0.05	0.02	0.026	2009
Pentachlorophenol	0.001	0.0002	0.0003	2009
Picloram	0.5	0.001	0.5	1997
Polychlorinated biphenyls (PCBs)	0.0005	0.0005	0.00009	2007
Simazine	0.004	0.001	0.004	2001
2,4,5-TP (Silvex)	0.05	0.001	0.003	2014
2,3,7,8-TCDD (dioxin)	$3x10^{-8}$	$5x10^{-9}$	$5x10^{-11}$	2010
Thiobencarb	0.07	0.001	0.07	2000
Toxaphene	0.003	0.001	0.00003	2003
Chemicals with MCLs in 22 CCR §64533—Disinfection Byproducts				
Total Trihalomethanes	0.080	--	0.0008	2010 draft
Bromodichloromethane	--	0.0010	--	--
Bromoform	--	0.0010	--	--
Chloroform	--	0.0010	--	--
Dibromochloromethane	--	0.0010	--	--
Haloacetic Acids (five) (HAA5)	0.060	--	--	--
Monochloroacetic Acid	--	0.0020	--	--
Dichloroacetic Adic	--	0.0010	--	--
Trichloroacetic Acid	--	0.0010	--	--
Monobromoacetic Acid	--	0.0010	--	--
Dibromoacetic Acid	--	0.0010	--	--

Bromate	0.010	0.0050**	0.0001	2009
Chlorite	1.0	0.020	0.05	2009
Chemicals with PHGs established in response to CDPH requests. These are not currently regulated drinking water contaminants.				
N-Nitrosodimethylamine (NDMA)	--	--	0.000003	2006
1,2,3-Trichloropropane	--	--	0.0000007	2009
*OEHHA's review of this chemical during the year indicated (rev20XX) resulted in no change in the PHG.				
**The DLR for Bromate is 0.0010 mg/L for analysis performed using EPA Method 317.0 Revision 2.0, 321.8, or 326.0.				

G-2

National Maximum Contaminant Levels

National Primary Drinking Water Regulations

Contaminant		MCL or TT[1] (mg/L)[2]	Potential health effects from long-term[3] exposure above the MCL	Common sources of contaminant in drinking water	Public Health Goal (mg/L)[2]
OC	Acrylamide	TT[4]	Nervous system or blood problems; increased risk of cancer	Added to water during sewage/ wastewater treatment	zero
OC	Alachlor	0.002	Eye, liver, kidney or spleen problems; anemia; increased risk of cancer	Runoff from herbicide used on row crops	zero
R	Alpha/photon emitters	15 picocuries per Liter (pCi/L)	Increased risk of cancer	Erosion of natural deposits of certain minerals that are radioactive and may emit a form of radiation known as alpha radiation	zero
IOC	Antimony	0.006	Increase in blood cholesterol; decrease in blood sugar	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder	0.006
IOC	Arsenic	0.010	Skin damage or problems with circulatory systems, and may have increased risk of getting cancer	Erosion of natural deposits; runoff from orchards; runoff from glass & electronics production wastes	0
IOC	Asbestos (fibers >10 micrometers)	7 million fibers per Liter (MFL)	Increased risk of developing benign intestinal polyps	Decay of asbestos cement in water mains; erosion of natural deposits	7 MFL
OC	Atrazine	0.003	Cardiovascular system or reproductive problems	Runoff from herbicide used on row crops	0.003
IOC	Barium	2	Increase in blood pressure	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits	2
OC	Benzene	0.005	Anemia; decrease in blood platelets; increased risk of cancer	Discharge from factories; leaching from gas storage tanks and landfills	zero
OC	Benzo(a)pyrene (PAHs)	0.0002	Reproductive difficulties; increased risk of cancer	Leaching from linings of water storage tanks and distribution lines	zero
IOC	Beryllium	0.004	Intestinal lesions	Discharge from metal refineries and coal-burning factories; discharge from electrical, aerospace, and defense industries	0.004
R	Beta photon emitters	4 millirems per year	Increased risk of cancer	Decay of natural and man-made deposits of certain minerals that are radioactive and may emit forms of radiation known as photons and beta radiation	zero
DBP	Bromate	0.010	Increased risk of cancer	Byproduct of drinking water disinfection	zero
IOC	Cadmium	0.005	Kidney damage	Corrosion of galvanized pipes; erosion of natural deposits; discharge from metal refineries; runoff from waste batteries and paints	0.005
OC	Carbofuran	0.04	Problems with blood, nervous system, or reproductive system	Leaching of soil fumigant used on rice and alfalfa	0.04
OC	Carbon tetrachloride	0.005	Liver problems; increased risk of cancer	Discharge from chemical plants and other industrial activities	zero
D	Chloramines (as Cl_2)	MRDL=4.0[1]	Eye/nose irritation; stomach discomfort; anemia	Water additive used to control microbes	MRDLG=4[1]
OC	Chlordane	0.002	Liver or nervous system problems; increased risk of cancer	Residue of banned termiticide	zero
D	Chlorine (as Cl_2)	MRDL=4.0[1]	Eye/nose irritation; stomach discomfort	Water additive used to control microbes	MRDLG=4[1]
D	Chlorine dioxide (as ClO_2)	MRDL=0.8[1]	Anemia; infants, young children, and fetuses of pregnant women: nervous system effects	Water additive used to control microbes	MRDLG=0.8[1]
DBP	Chlorite	1.0	Anemia; infants, young children, and fetuses of pregnant women: nervous system effects	Byproduct of drinking water disinfection	0.8
OC	Chlorobenzene	0.1	Liver or kidney problems	Discharge from chemical and agricultural chemical factories	0.1
IOC	Chromium (total)	0.1	Allergic dermatitis	Discharge from steel and pulp mills; erosion of natural deposits	0.1
IOC	Copper	TT[5]; Action Level = 1.3	Short-term exposure: Gastrointestinal distress. Long-term exposure: Liver or kidney damage. People with Wilson's Disease should consult their personal doctor if the amount of copper in their water exceeds the action level	Corrosion of household plumbing systems; erosion of natural deposits	1.3
M	*Cryptosporidium*	TT[7]	Short-term exposure: Gastrointestinal illness (e.g., diarrhea, vomiting, cramps)	Human and animal fecal waste	zero

LEGEND

D Disinfectant | IOC Inorganic Chemical | OC Organic Chemical

DBP Disinfection Byproduct | M Microorganism | R Radionuclides

Contaminant	MCL or TT[1] (mg/L)[2]	Potential health effects from long-term[3] exposure above the MCL	Common sources of contaminant in drinking water	Public Health Goal (mg/L)[2]
IOC Cyanide (as free cyanide)	0.2	Nerve damage or thyroid problems	Discharge from steel/metal factories; discharge from plastic and fertilizer factories	0.2
OC 2,4-D	0.07	Kidney, liver, or adrenal gland problems	Runoff from herbicide used on row crops	0.07
OC Dalapon	0.2	Minor kidney changes	Runoff from herbicide used on rights of way	0.2
OC 1,2-Dibromo-3-chloropropane (DBCP)	0.0002	Reproductive difficulties; increased risk of cancer	Runoff/leaching from soil fumigant used on soybeans, cotton, pineapples, and orchards	zero
OC o-Dichlorobenzene	0.6	Liver, kidney, or circulatory system problems	Discharge from industrial chemical factories	0.6
OC p-Dichlorobenzene	0.075	Anemia; liver, kidney or spleen damage; changes in blood	Discharge from industrial chemical factories	0.075
OC 1,2-Dichloroethane	0.005	Increased risk of cancer	Discharge from industrial chemical factories	zero
OC 1,1-Dichloroethylene	0.007	Liver problems	Discharge from industrial chemical factories	0.007
OC cis-1,2-Dichloroethylene	0.07	Liver problems	Discharge from industrial chemical factories	0.07
OC trans-1,2-Dichloroethylene	0.1	Liver problems	Discharge from industrial chemical factories	0.1
OC Dichloromethane	0.005	Liver problems; increased risk of cancer	Discharge from drug and chemical factories	zero
OC 1,2-Dichloropropane	0.005	Increased risk of cancer	Discharge from industrial chemical factories	zero
OC Di(2-ethylhexyl) adipate	0.4	Weight loss, liver problems, or possible reproductive difficulties	Discharge from chemical factories	0.4
OC Di(2-ethylhexyl) phthalate	0.006	Reproductive difficulties; liver problems; increased risk of cancer	Discharge from rubber and chemical factories	zero
OC Dinoseb	0.007	Reproductive difficulties	Runoff from herbicide used on soybeans and vegetables	0.007
OC Dioxin (2,3,7,8-TCDD)	0.00000003	Reproductive difficulties; increased risk of cancer	Emissions from waste incineration and other combustion; discharge from chemical factories	zero
OC Diquat	0.02	Cataracts	Runoff from herbicide use	0.02
OC Endothall	0.1	Stomach and intestinal problems	Runoff from herbicide use	0.1
OC Endrin	0.002	Liver problems	Residue of banned insecticide	0.002
OC Epichlorohydrin	TT[4]	Increased cancer risk; stomach problems	Discharge from industrial chemical factories; an impurity of some water treatment chemicals	zero
OC Ethylbenzene	0.7	Liver or kidney problems	Discharge from petroleum refineries	0.7
OC Ethylene dibromide	0.00005	Problems with liver, stomach, reproductive system, or kidneys; increased risk of cancer	Discharge from petroleum refineries	zero
M Fecal coliform and *E. coli*	MCL[6]	Fecal coliforms and *E. coli* are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes may cause short term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, and people with severely compromised immune systems.	Human and animal fecal waste	zero[6]
IOC Fluoride	4.0	Bone disease (pain and tenderness of the bones); children may get mottled teeth	Water additive which promotes strong teeth; erosion of natural deposits; discharge from fertilizer and aluminum factories	4.0
M *Giardia lamblia*	TT[7]	Short-term exposure: Gastrointestinal illness (e.g., diarrhea, vomiting, cramps)	Human and animal fecal waste	zero
OC Glyphosate	0.7	Kidney problems; reproductive difficulties	Runoff from herbicide use	0.7
DBP Haloacetic acids (HAA5)	0.060	Increased risk of cancer	Byproduct of drinking water disinfection	n/a[9]
OC Heptachlor	0.0004	Liver damage; increased risk of cancer	Residue of banned termiticide	zero
OC Heptachlor epoxide	0.0002	Liver damage; increased risk of cancer	Breakdown of heptachlor	zero
M Heterotrophic plate count (HPC)	TT[7]	HPC has no health effects; it is an analytic method used to measure the variety of bacteria that are common in water. The lower the concentration of bacteria in drinking water, the better maintained the water system is.	HPC measures a range of bacteria that are naturally present in the environment	n/a

LEGEND

D Disinfectant
IOC Inorganic Chemical
OC Organic Chemical
DBP Disinfection Byproduct
M Microorganism
R Radionuclides

Contaminant		MCL or TT[1] (mg/L)[2]	Potential health effects from long-term[3] exposure above the MCL	Common sources of contaminant in drinking water	Public Health Goal (mg/L)[2]
OC	Hexachlorobenzene	0.001	Liver or kidney problems; reproductive difficulties; increased risk of cancer	Discharge from metal refineries and agricultural chemical factories	zero
OC	Hexachlorocyclopentadiene	0.05	Kidney or stomach problems	Discharge from chemical factories	0.05
IOC	Lead	TT5; Action Level=0.015	Infants and children: Delays in physical or or mental development; children could show slight deficits in attention span and learning abilities; Adults: Kidney problems; high blood pressure	Corrosion of household plumbing systems; erosion of natural deposits	zero
M	*Legionella*	TT7	Legionnaire's Disease, a type of pneumonia	Found naturally in water; multiplies in heating systems	zero
OC	Lindane	0.0002	Liver or kidney problems	Runoff/leaching from insecticide used on cattle, lumber, gardens	0.0002
IOC	Mercury (inorganic)	0.002	Kidney damage	Erosion of natural deposits; discharge from refineries and factories; runoff from landfills and croplands	0.002
OC	Methoxychlor	0.04	Reproductive difficulties	Runoff/leaching from insecticide used on fruits, vegetables, alfalfa, livestock	0.04
IOC	Nitrate (measured as Nitrogen)	10	Infants below the age of six months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue-baby syndrome.	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits	10
IOC	Nitrite (measured as Nitrogen)	1	Infants below the age of six months who drink water containing nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue-baby syndrome.	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits	1
OC	Oxamyl (Vydate)	0.2	Slight nervous system effects	Runoff/leaching from insecticide used on apples, potatoes, and tomatoes	0.2
OC	Pentachlorophenol	0.001	Liver or kidney problems; increased cancer risk	Discharge from wood-preserving factories	zero
OC	Picloram	0.5	Liver problems	Herbicide runoff	0.5
OC	Polychlorinated biphenyls (PCBs)	0.0005	Skin changes; thymus gland problems; immune deficiencies; reproductive or nervous system difficulties; increased risk of cancer	Runoff from landfills; discharge of waste chemicals	zero
R	Radium 226 and Radium 228 (combined)	5 pCi/L	Increased risk of cancer	Erosion of natural deposits	zero
IOC	Selenium	0.05	Hair or fingernail loss; numbness in fingers or toes; circulatory problems	Discharge from petroleum and metal refineries; erosion of natural deposits; discharge from mines	0.05
OC	Simazine	0.004	Problems with blood	Herbicide runoff	0.004
OC	Styrene	0.1	Liver, kidney, or circulatory system problems	Discharge from rubber and plastic factories; leaching from landfills	0.1
OC	Tetrachloroethylene	0.005	Liver problems; increased risk of cancer	Discharge from factories and dry cleaners	zero
IOC	Thallium	0.002	Hair loss; changes in blood; kidney, intestine, or liver problems	Leaching from ore-processing sites; discharge from electronics, glass, and drug factories	0.0005
OC	Toluene	1	Nervous system, kidney, or liver problems	Discharge from petroleum factories	1
M	Total Coliforms	5.0 percent[8]	Coliforms are bacteria that indicate that other, potentially harmful bacteria may be present. See fecal coliforms and *E. coli*	Naturally present in the environment	zero
DBP	Total Trihalomethanes (TTHMs)	0.080	Liver, kidney or central nervous system problems; increased risk of cancer	Byproduct of drinking water disinfection	n/a[9]
OC	Toxaphene	0.003	Kidney, liver, or thyroid problems; increased risk of cancer	Runoff/leaching from insecticide used on cotton and cattle	zero
OC	2,4,5-TP (Silvex)	0.05	Liver problems	Residue of banned herbicide	0.05
OC	1,2,4-Trichlorobenzene	0.07	Changes in adrenal glands	Discharge from textile finishing factories	0.07
OC	1,1,1-Trichloroethane	0.2	Liver, nervous system, or circulatory problems	Discharge from metal degreasing sites and other factories	0.2
OC	1,1,2-Trichloroethane	0.005	Liver, kidney, or immune system problems	Discharge from industrial chemical factories	0.003
OC	Trichloroethylene	0.005	Liver problems; increased risk of cancer	Discharge from metal degreasing sites and other factories	zero

LEGEND

D Disinfectant
DBP Disinfection Byproduct
IOC Inorganic Chemical
M Microorganism
OC Organic Chemical
R Radionuclides

Contaminant	MCL or TT[1] (mg/L)[2]	Potential health effects from long-term[3] exposure above the MCL	Common sources of contaminant in drinking water	Public Health Goal (mg/L)[2]
M Turbidity	TT[7]	Turbidity is a measure of the cloudiness of water. It is used to indicate water quality and filtration effectiveness (e.g., whether disease-causing organisms are present). Higher turbidity levels are often associated with higher levels of disease-causing microorganisms such as viruses, parasites and some bacteria. These organisms can cause short term symptoms such as nausea, cramps, diarrhea, and associated headaches.	Soil runoff	n/a
R Uranium	30µg/L	Increased risk of cancer, kidney toxicity	Erosion of natural deposits	zero
OC Vinyl chloride	0.002	Increased risk of cancer	Leaching from PVC pipes; discharge from plastic factories	zero
M Viruses (enteric)	TT[7]	Short-term exposure: Gastrointestinal illness (e.g., diarrhea, vomiting, cramps)	Human and animal fecal waste	zero
OC Xylenes (total)	10	Nervous system damage	Discharge from petroleum factories; discharge from chemical factories	10

LEGEND

D Disinfectant
DBP Disinfection Byproduct
IOC Inorganic Chemical
M Microorganism
OC Organic Chemical
R Radionuclides

NOTES

1 Definitions

- Maximum Contaminant Level Goal (MCLG)—The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety and are non-enforceable public health goals.
- Maximum Contaminant Level (MCL)—The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to MCLGs as feasible using the best available treatment technology and taking cost into consideration. MCLs are enforceable standards.
- Maximum Residual Disinfectant Level Goal (MRDLG)—The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
- Maximum Residual Disinfectant Level (MRDL)—The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
- Treatment Technique (TT)—A required process intended to reduce the level of a contaminant in drinking water.

2 Units are in milligrams per liter (mg/L) unless otherwise noted. Milligrams per liter are equivalent to parts per million (ppm).

3 Health effects are from long-term exposure unless specified as short-term exposure.

4 Each water system must certify annually, in writing, to the state (using third-party or manufacturers certification) that when it uses acrylamide and/or epichlorohydrin to treat water, the combination (or product) of dose and monomer level does not exceed the levels specified, as follows: Acrylamide = 0.05 percent dosed at 1 mg/L (or equivalent); Epichlorohydrin = 0.01 percent dosed at 20 mg/L (or equivalent).

5 Lead and copper are regulated by a Treatment Technique that requires systems to control the corrosiveness of their water. If more than 10 percent of tap water samples exceed the action level, water systems must take additional steps. For copper, the action level is 1.3 mg/L, and for lead is 0.015 mg/L.

6 A routine sample that is fecal coliform-positive or *E. coli*-positive triggers repeat samples--if any repeat sample is total coliform-positive, the system has an acute MCL violation. A routine sample that is total coliform-positive and fecal coliform-negative or *E. coli*-negative triggers repeat samples--if any repeat sample is fecal coliform-positive or *E. coli*-positive, the system has an acute MCL violation. See also Total Coliforms.

7 EPA's surface water treatment rules require systems using surface water or ground water under the direct influence of surface water to (1) disinfect their water, and (2) filter their water or meet criteria for avoiding filtration so that the following contaminants are controlled at the following levels:

- *Cryptosporidium*: 99 percent removal for systems that filter. Unfiltered systems are required to include Cryptosporidium in their existing watershed control provisions.
- Giardia lamblia: 99.9 percent removal/inactivation
- Viruses: 99.99 percent removal/inactivation
- *Legionella*: No limit, but EPA believes that if *Giardia* and viruses are removed/inactivated according to the treatment techniques in the surface water treatment rule, *Legionella* will also be controlled.
- Turbidity: For systems that use conventional or direct filtration, at no time can turbidity (cloudiness of water) go higher than 1 nephelolometric turbidity unit (NTU), and samples for turbidity must be less than or equal to 0.3 NTU in at least 95 percent of the samples in any month. Systems that use filtration other than conventional or direct filtration must follow state limits, which must include turbidity at no time exceeding 5 NTU.
- HPC: No more than 500 bacterial colonies per milliliter
- Long Term 1 Enhanced Surface Water Treatment; Surface water systems or ground water systems under the direct influence of surface water serving fewer than 10,000 people must comply with the applicable Long Term 1 Enhanced Surface Water Treatment Rule provisions (e.g. turbidity standards, individual filter monitoring, *Cryptosporidium* removal requirements, updated watershed control requirements for unfiltered systems).
- Long Term 2 Enhanced Surface Water Treatment; This rule applies to all surface water systems or ground water systems under the direct influence of surface water. The rule targets additional *Cryptosporidium* treatment requirements for higher risk systems and includes provisions to reduce risks from uncovered finished water storages facilities and to ensure that the systems maintain microbial protection as they take steps to reduce the formation of disinfection byproducts. (Monitoring start dates are staggered by system size. The largest systems (serving at least 100,000 people) will begin monitoring in October 2006 and the smallest systems (serving fewer than 10,000 people) will not begin monitoring until October 2008. After completing monitoring and determining their treatment bin, systems generally have three years to comply with any additional treatment requirements.)
- Filter Backwash Recycling: The Filter Backwash Recycling Rule requires systems that recycle to return specific recycle flows through all processes of the system's existing conventional or direct filtration system or at an alternate location approved by the state.

8 No more than 5.0 percent samples total coliform-positive in a month. (For water systems that collect fewer than 40 routine samples per month, no more than one sample can be total coliform-positive per month.) Every sample that has total coliform must be analyzed for either fecal coliforms or *E. coli*. If two consecutive TC-positive samples, and one is also positive for *E. coli* or fecal coliforms, system has an acute MCL violation.

9 Although there is no collective MCLG for this contaminant group, there are individual MCLGs for some of the individual contaminants:

- Haloacetic acids: dichloroacetic acid (zero); trichloroacetic acid (0.3 mg/L)
- Trihalomethanes: bromodichloromethane (zero); bromoform (zero); dibromochloromethane (0.06 mg/L)

National Secondary Drinking Water Regulation

National Secondary Drinking Water Regulations are non-enforceable guidelines regarding contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water. EPA recommends secondary standards to water systems but does not require systems to comply. However, some states may choose to adopt them as enforceable standards.

Contaminant	Secondary Maximum Contaminant Level
Aluminum	0.05 to 0.2 mg/L
Chloride	250 mg/L
Color	15 (color units)
Copper	1.0 mg/L
Corrosivity	noncorrosive
Fluoride	2.0 mg/L
Foaming Agents	0.5 mg/L
Iron	0.3 mg/L
Manganese	0.05 mg/L
Odor	3 threshold odor number
pH	6.5-8.5
Silver	0.10 mg/L
Sulfate	250 mg/L
Total Dissolved Solids	500 mg/L
Zinc	5 mg/L

For More Information

EPA's Safe Drinking Water Web site:
http://www.epa.gov/safewater/

EPA's Safe Drinking Water Hotline:
(800) 426-4791

To order additional posters or other ground water and drinking water publications, please contact the National Service Center for Environmental Publications at :
(800) 490-9198, or
email: nscep@bps-lmit.com.

United States Environmental Protection Agency

EPA 816-F-09-004
May 2009

Appendix H

Complete Data Sets

H-1

WID Intake Raw Water Complete Data Set

Constituent	pH	Temp	Turbidity Daily	Total Coliform	E. Coli	Giardia	Crypto.	TOC	DOC
Units	**SU**	**Deg C**	**NTU**	**col/100ml**	**MPN/100mL**	**Cysts/L**	**Oocysts/L**	**mg/L**	**mg/l**
3/4/2010	7.8	11.2	3.2	>1600	300	0.38	0.14		
3/17/2010	7.7	13.3	1.6	900	17	0	0	1.6	1.3
3/31/2010	8.5	14.3	1.6	900	170	0.05	0		
4/14/2010	8.4	12.9	2.2	>1600	50	0.42	0.05	1.8	1.5
4/26/2010	8.1	16.7	1.9	>1600	50	0.55	0		
5/12/2010	8.1	15.0	2.1	500	8	0.14	0	2.4	2.2
5/26/2010	8.0	14.0	1.8	>1600	70	1.65	0		
6/9/2010	8.3	16.0	2.2	1600	30	1.02	0		
6/23/2010	8.3	18.1	1.5	>1600	22	0.09	0	2.5	2.1
7/7/2010	8.4	15.9	2.3	>1600	30	0.54	0		
7/21/2010	7.5	19.6	2.0	1600	17	0.09	0	1.6	1.5
8/4/2010	7.4	18.8	1.5	900	21	0.14	0		
8/18/2010	7.3	19.6	1.6	900	50	0.37	0.05	1.8	1.7
9/1/2010	7.8	22.2	1.6	1600	80	0.14	0		
9/15/2010	8.3	18.5	2.2	1600	240	0.05	0	1.9	1.6
9/29/2010	7.5	19.0	1.0	>1600	500	0	0		
10/13/2010	7.6	16.0	1.8	900	240	0.14	0		
10/27/2010	7.5	14.8	2.1	>1600	80	0.88	0	1.6	1.5
11/10/2010	6.6	14.6	1.8	300	50	0.62	0	2	1.7
11/22/2010	6.3	13.0	1.8	>1600	50	0.37	0		
12/9/2010	7.6	13.3	1.6	>1600	500	0.24	0.05		
12/21/2010	8.6	11.4	3.7	>1600	500	0.10	0.05	2.2	1.9
1/5/2011	7.4	9.6	3.7	300	50	0	0		
1/19/2011	7.5	9.6	3.1	30	30	0	0	1.8	1.6
2/2/2011	8.3	9.7	6.1	500	110	0.05	0.05		
2/16/2011	8.2	11.0	7.7	>1600	500	0	0	3.7	1.7
3/2/2011	8.8	11.0	3.5	>1600	900	0.05	0.05		
3/16/2011	6.7	10.8	2.7	>1600	240	0	0	1.9	1.7
3/30/2011	8.1	11.1	4.5	1600	30	0.14	0		
4/13/2011	7.9	13.6	2.9	500	13	0	0	2.0	1.9
4/27/2011	8.3	12.0	2.8	1600	50	0	0		
5/11/2011	7.5	14.3	2.5	500	17	0	0	1.6	1.6
5/25/2011	8.8	14.7	2.4	500	22	0.28	0		
6/8/2011	7.3	15.9	2.6	>1600	23	0	0	1.3	1.9
6/22/2011	8.3	19.8	2.1	1600	30	0.09	0		
7/6/2011	8.3	17.8	4.6	>1600	220	0.09	0.05		
7/20/2011	8.1	18.7	2.3	>1600	17	0	0	1.2	1
8/4/2011	8.4	18.6	2.9	>1600	30	0.14	0.05		
8/17/2011	8.6	19.0	2.1	>1600	50	0	0	1.4	1.6
8/31/2011	8.4	19.0	1.7	>1600	50	0	0		
9/14/2011	9.1	19.9	1.9	1600	30	0	0	1.3	2.1
9/28/2011	8.4	17.9	2.1	1600	30	0.3	0		
10/12/2011	6.4	16.5	1.4	>1600	500	0.4	0	1.4	2.1
10/26/2011	7.7	15.3	2.0	>1600	300	0.3	0		
11/9/2011	7.8	13.6	1.5	>1600	110	0.89	0	1.4	2.1
11/22/2011	7.8	12.8	1.7	1600	170	0.3	0		
12/7/2011	7.4	9.0	2.1	1600	7	0.6	<0.05	2.8	4.1
12/21/2011	7.6	9.5	1.8	500	30	0.4	0.05		
1/4/2012	7.7	9.0	1.9	280	70	<0.05	0.05		
1/19/2012	7.8	7.9	2.1	900	9	0.2	0.1	1.7	2.0
2/1/2012	7.9	10.2	1.9	>1600	240	0.2	<0.05		
2/29/2012	6.9	11.3	1.2	1600	21	<0.05	<0.05	1.6	1.9
3/14/2012	7.0	12.8	2.5	>1600	300	<0.05	<0.05		
3/28/2012	6.9	13.6	2.5	900	50	<0.05	<0.05		
4/10/2012	6.5	15.8	1.6	240	2	0.05	<0.05		
1/1/2013	7.10		12.25	2855.00	189.00			2.40	
2/1/2013			4.88						
3/1/2013			8.56	822.00	38.00			2.40	
4/1/2013			19.38	2675.00	75.00			2.30	
5/1/2013			8.42	1127.39	38.30			2.00	
6/1/2013			8.36	2446.00	28.50			1.70	
7/1/2013			7.74	2426.09	27.70			1.80	
8/1/2013			6.55	2930.00	22.55			1.50	
9/1/2013			6.25	3766.67	389.57			1.70	
10/1/2013			5.40	2907.78	96.43			1.50	
11/1/2013			3.49	3897.67	146.86			1.90	
12/1/2013			2.63	5191.36	159.45			2.00	
1/1/2014	6.60		2.86	4473.41	15.86			1.50	
2/1/2014			4.22						
3/1/2014			5.22	6987.67	99.24			2.00	
4/1/2014			4.28	5297.23	89.64			2.40	
5/1/2014			3.68	2605.45	20.68			1.90	
6/1/2014			5.47	4655.24	44.33			1.80	
7/1/2014			4.08	3692.26	24.09			1.90	
8/1/2014			4.50	1385.95	15.71			2.20	
9/1/2014			7.12	3696.86	204.64			1.80	
10/1/2014			4.02	2034.17	67.83			1.8	
11/1/2014			3.45	5050.65	39.95			2.10	
12/1/2014			4.32	11006.91	213.43			2.40	
MCL	**8.5**								
Minimum	**6.30**	**7.90**	**1.00**	**30.00**	**2.00**	**0.00**	**0.00**	**1.20**	**1.00**
Maximum	**9.10**	**22.20**	**19.38**	**11006.91**	**900.00**	**1.65**	**0.14**	**3.70**	**4.10**
Average	**7.77**	**14.54**	**3.53**	**2145.78**	**121.72**	**0.24**	**0.02**	**1.90**	**1.85**
2010 Average	8.10		2.10	1250.00	134.00	0.35	0.10	1.70	1.40
2007 Average	7.20		2.40	1600.00	38.00	0.18	0.05	1.80	1.60

Constituent	Color	Odor	Alkalinity	Bicarbonate Alkalinity	Carbonat e	Hydroxid e	Hardness	Uranium	Gross Alpha
Units	**SU**	**TON**	**mg/L**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**pCi/L**	**pCi/L**
3/4/2010									
3/17/2010	5.0	<1.0	<2.5	20	<2.5	<2.5	16		
3/31/2010									
4/14/2010	5	<1.0	16 (J)	20	<2.5	<2.5	16		
4/26/2010									
5/12/2010	5.0	<1.0	18 (J)	22	<2.5	<2.5	15	0.000	0.153
5/26/2010									
6/9/2010									
6/23/2010	5.0	<1.0	22	27	<2.5	<2.5	16		
7/7/2010									
7/21/2010	5.0	<1.0	32	39	<2.5	<2.5	17	0.392	0.033
8/4/2010									
8/18/2010	10	2.0	17 (J)	21	<2.5	<2.5	16	0.045	
9/1/2010									
9/15/2010	10	2.0	32	39	<2.5	<2.5	15		
9/29/2010									
10/13/2010									
10/27/2010	5.0	<1.0	45	55	<2.5	<2.5	15		
11/10/2010	<1.0	<1.0	48	59	<2.5	<2.5	14	0.000	0.000
11/22/2010									
12/9/2010									
12/21/2010	10	1.0	22	27	<2.5	<2.5	16		
1/5/2011									
1/19/2011	5.0	<1.0	18 (J)	22	<2.5	<2.5	15		
2/2/2011									
2/16/2011	7.5	6.0	16	16	<2.0	<2.0	15		
3/2/2011									
3/16/2011	10	20	17	17	ND	ND	15	5.21	0.000
3/30/2011									
4/13/2011	12	15	23	23	<2.0	<2.0	18		
4/27/2011									
5/11/2011	7.5	<1.0	22	22	<2.0	<2.0	17		
5/25/2011									
6/8/2011	10.0	4	19	19	ND	ND	15	0.108	0.337
6/22/2011									
7/6/2011									
7/20/2011	7.5	4.0	17	21	<1.2	<0.70	14		
8/4/2011									
8/17/2011	7.5	9.0	17	21	<1.2	<0.70	9.0		
8/31/2011									
9/14/2011	5.0	<1.0	13	18	<2.5	<2.5	14	0.295	0.256
9/28/2011									
10/12/2011	10	4	16	20	<1.2	<0.70	7.9		
10/26/2011									
11/9/2011	5	1	13	16	<1.2	<0.70	7.8		
11/22/2011									
12/7/2011	5.0	2.0	20	24	<2.5	<2.5	13	0.000	0.197
12/21/2011									
1/4/2012									
1/19/2012	5.0	1.0	13	18	<3.0	<3.0	14		
2/1/2012									
2/29/2012	5.0	4.0	12	17	<4.9	<4.9	14		
3/14/2012									
3/28/2012									
4/10/2012									
1/1/2013	10.00	1.00	16.50	20.00	0.00	0.00	16.00		
2/1/2013									
3/1/2013			17.00						
4/1/2013			17.00						
5/1/2013			16.00						
6/1/2013			15.00						
7/1/2013			16.00						
8/1/2013			17.00						
9/1/2013			17.00						
10/1/2013			16.00					0.10	1.00
11/1/2013			15.00						
12/1/2013			15.00						
1/1/2014	5.00	3.00	16.00	18.00	0.00	0.00	16.00		
2/1/2014									
3/1/2014			16.00						
4/1/2014			16.00						
5/1/2014			16.00						
6/1/2014			16.00						
7/1/2014			17.00						
8/1/2014			20.00						
9/1/2014			22.00						
10/1/2014			16						
11/1/2014			21.00						
12/1/2014			17.00						
MCL	**15**			**200**					
Minimum	**5.00**	**1.00**	**12.00**	**16.00**	**0.00**	**0.00**	**7.80**	**0.00**	**0.00**
Maximum	**12.00**	**20.00**	**22.00**	**59.00**	**0.00**	**0.00**	**18.00**	**5.21**	**1.00**
Average	**7.08**	**4.94**	**16.38**	**24.65**	**0.00**	**0.00**	**14.49**	**0.68**	**0.25**
2010 Average	5.00	1.00		20.00	<2.5	<2.5	16.00		
2007 Average			20.00				15.00		

Constituent	Chloride	Fluoride	Nitrite	Nitrate	Sulfate	MBAS	Cyanide	Aluminu m	Antimon y	Arsenic	Barium	Berylliu m	Chromiu m
Units	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
3/4/2010													
3/17/2010													
3/31/2010													
4/14/2010													
4/26/2010													
5/12/2010	3.0	<0.063	<0.085	<0.3	2.3	<0.031	<2.8	83	<0.068	0.73 (J)	18	<0.20	0.58 (J)
5/26/2010													
6/9/2010													
6/23/2010													
7/7/2010													
7/21/2010	3.1	<0.063	<0.085	0.96 (J)	2.2	<0.031	<2.8	94	<0.068	0.59 (J)	18	<0.20	0.93 (J)
8/4/2010													
8/18/2010													
9/1/2010													
9/15/2010													
9/29/2010													
10/13/2010													
10/27/2010													
11/10/2010	2.2	<0.063	<0.085	0.92 (J)	1.7 (J)	<0.031	<2.8	52	<0.068	0.45 (J)	15	<0.20	0.68 (J)
11/22/2010													
12/9/2010													
12/21/2010													
1/5/2011													
1/19/2011													
2/2/2011													
2/16/2011													
3/2/2011													
3/16/2011	1.7	<0.1	<0.4	<2	1.9	ND	<100	100	<6	<2	<100	<1	<10
3/30/2011													
4/13/2011													
4/27/2011													
5/11/2011													
5/25/2011													
6/8/2011	1.3	0.072 (J)	ND	0.34 (J)	1.7	ND	ND	110	0.76 (J)	ND	16	ND	ND
6/22/2011													
7/6/2011													
7/20/2011													
8/4/2011													
8/17/2011													
8/31/2011													
9/14/2011	1.1 (J)	<0.0036	ND	ND	1.2 (J)	ND	ND	57	0.13 (J)	0.59 (J)	15	ND	0.91 (J)
9/28/2011													
10/12/2011													
10/26/2011													
11/9/2011													
11/22/2011													
12/7/2011	0.92 (J)	0.038 (J)	ND	ND	1.1 (J)	ND	ND	59	0.071 (J)	0.77 (J)	18	ND	0.8 (J)
12/21/2011													
1/4/2012													
1/19/2012													
2/1/2012				<2									
2/29/2012													
3/14/2012													
3/28/2012													
4/10/2012													
1/1/2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.00	0.00	0.00	20.00	0.00	0.00
2/1/2013													
3/1/2013													
4/1/2013													
5/1/2013													
6/1/2013													
7/1/2013													
8/1/2013													
9/1/2013													
10/1/2013													
11/1/2013													
12/1/2013													
1/1/2014	4.90	0.00	0.00	0.00	0.00	0.00	0.00	36.00	0.00	0.00	19.00	0.00	0.00
2/1/2014													
3/1/2014													
4/1/2014													
5/1/2014													
6/1/2014													
7/1/2014													
8/1/2014													
9/1/2014													
10/1/2014													
11/1/2014													
12/1/2014													
MCL	**250**	**500**						**1000**	**6**	**10**	**1000**	**4**	**50**
Minimum	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**36.00**	**0.00**	**0.00**	**15.00**	**0.00**	**0.00**
Maximum	**4.90**	**0.00**	**0.00**	**0.00**	**2.30**	**0.00**	**0.00**	**110.00**	**0.00**	**0.00**	**20.00**	**0.00**	**0.00**
Average	**2.31**	**0.00**	**0.00**	**0.00**	**1.35**	**0.00**	**0.00**	**72.56**	**0.00**	**0.00**	**17.38**	**0.00**	**0.00**
2010 Average													
2007 Average	2.60				2.40								5

Constituent	Copper	Iron	Lead	Manganese	Mercury	Nickel	Potassium	Selenium	Silver	Zinc	Perchlorat e
Units	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**mg/l**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
3/4/2010											
3/17/2010											
3/31/2010											
4/14/2010											
4/26/2010											
5/12/2010	1.7 (J)	140	0.085	13	<0.062	0.38 (J)	0.78 (J)	0.22 (J)	<0.15	2.4	<0.82
5/26/2010											
6/9/2010											
6/23/2010											
7/7/2010											
7/21/2010	1.8 (J)	130	0.037	18	<0.062	0.34 (J)	0.82 (J)	<0.17	<0.15	3.2	<0.82
8/4/2010											
8/18/2010											
9/1/2010											
9/15/2010											
9/29/2010											
10/13/2010											
10/27/2010											
11/10/2010	1.3 (J)	120	0.070	12	<0.062	0.39 (J)	0.74 (J)	0.20 (J)	<0.15	<0.80	<0.82
11/22/2010											
12/9/2010											
12/21/2010											
1/5/2011											
1/19/2011											
2/2/2011											
2/16/2011											
3/2/2011											
3/16/2011	<50	160	<5	<20	<1	<10	0.76	<5	<10	<50	<4
3/30/2011											
4/13/2011											
4/27/2011											
5/11/2011											
5/25/2011											
6/8/2011	1.1 (J)	110	ND	14	ND	ND	0.71	ND	ND	4.6	ND
6/22/2011											
7/6/2011											
7/20/2011											
8/4/2011											
8/17/2011											
8/31/2011											
9/14/2011	1.4 (J)	130	0.10	11	0.10 (J)	0.53 (J)	1.2	0.26 (J)	ND	1.4	ND
9/28/2011											
10/12/2011											
10/26/2011											
11/9/2011											
11/22/2011											
12/7/2011	1.7 (J)	91 (J)	0.11	8.6	0.11 (J)	0.44 (J)	0.89 (J)	0.28 (J)	ND	2.7	ND
12/21/2011											
1/4/2012											
1/19/2012											
2/1/2012											
2/29/2012											
3/14/2012											
3/28/2012											
4/10/2012											
1/1/2013	0.00	0.10	0.00	1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/1/2013											
3/1/2013											
4/1/2013											
5/1/2013											
6/1/2013											
7/1/2013											
8/1/2013											
9/1/2013											
10/1/2013											
11/1/2013											
12/1/2013											
1/1/2014	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/1/2014											
3/1/2014											
4/1/2014											
5/1/2014											
6/1/2014											
7/1/2014											
8/1/2014											
9/1/2014											
10/1/2014											
11/1/2014											
12/1/2014											
MCL	**1300**	**50**	**15**	**50**	**2**	**100**		**50**	**100**	**5000**	
Minimum	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Maximum	**0.00**	**160**	**0.00**	**18.00**	**0.00**	**0.00**	**1.20**	**0.00**	**0.00**	**0.00**	**0.00**
Average	**0.00**	**98.76**	**0.00**	**9.74**	**0.00**	**0.00**	**0.53**	**0.00**	**0.00**	**0.00**	**0.00**
2010 Average											
2007 Average	5	120		12.1						11	

H-2

SWTF Finished Water Data

MOORE TWINING ASSOCIATES, INC.

California ELAP Certificate #1371

2527 Fresno Street
Fresno, CA 93721
(559) 268-7021 Phone
(559) 268-0740 Fax

February 15, 2013

Work Order #: 3A29032

Andrew Richle
City of Lodi
1331 South Ham Lane
Lodi, CA 95242

RE: Drinking Water- EDT

Enclosed are the analytical results for samples received by our laboratory on 01/29/13 . For your reference, these analyses have been assigned laboratory work order number 3A29032.

All analyses have been performed according to our laboratory's quality assurance program. All results are intended to be considered in their entirety, Moore Twining Associates, Inc. (MTA) is not responsible for use of less than complete reports. Results apply only to samples analyzed.

If you have any questions, please feel free to contact us at the number listed above.

Sincerely,

Moore Twining Associates, Inc.

Lisa Montijo
Client Services Assistant

MOORE TWINING ASSOCIATES, INC.

California ELAP Certificate #1371

2527 Fresno Street
Fresno, CA 93721
(559) 268-7021 Phone
(559) 268-0740 Fax

City of Lodi
1331 South Ham Lane
Lodi CA, 95242

Project: Drinking Water- EDT
Project Number: Drinking Water
Project Manager: Andrew Richle

Reported:
02/15/13 09:32

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Treated Water	3A29032-01	Surface Water	01/29/13 09:20	01/29/13 15:55

CASE NARRATIVE:

Hold time was exceeded for EPA 505 analysis due to instrument malfunction. JCM 2/6/13

MOORE TWINING ASSOCIATES, INC.

California ELAP Certificate #1371

2527 Fresno Street
Fresno, CA 93721
(559) 268-7021 Phone
(559) 268-0740 Fax

City of Lodi
1331 South Ham Lane
Lodi CA, 95242

Project: Drinking Water- EDT
Project Number: Drinking Water
Project Manager: Andrew Richle

Reported:
02/15/13 09:32

Treated Water

3A29032-01 (Surface Water) Sampled:01/29/13 09:20

Analyte	Notes.	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Semi-Volatile Organics									
3-Hydroxycarbofuran		ND	3.0	µg/L	1	T3B0401	02/04/13	02/04/13	EPA 531.2
Aldicarb		ND	3.0	µg/L	1	T3B0401	02/04/13	02/04/13	EPA 531.2
Aldicarb sulfone		ND	4.0	µg/L	1	T3B0401	02/04/13	02/04/13	EPA 531.2
Aldicarb sulfoxide		ND	3.0	µg/L	1	T3B0401	02/04/13	02/04/13	EPA 531.2
Carbaryl		ND	5.0	µg/L	1	T3B0401	02/04/13	02/04/13	EPA 531.2
Carbofuran		ND	5.0	µg/L	1	T3B0401	02/04/13	02/04/13	EPA 531.2
Methiocarb		ND	5.0	µg/L	1	T3B0401	02/04/13	02/04/13	EPA 531.2
Methomyl		ND	2.0	µg/L	1	T3B0401	02/04/13	02/04/13	EPA 531.2
Oxamyl		ND	20	µg/L	1	T3B0401	02/04/13	02/04/13	EPA 531.2
Propoxur (Baygon)		ND	5.0	µg/L	1	T3B0401	02/04/13	02/04/13	EPA 531.2
Surrogate: BDMC		*94.9 %*	*70-130*			*T3B0401*	*02/04/13*	*02/04/13*	*EPA 531.2*
Volatile Organics									
1,1,1,2-Tetrachloroethane		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
1,1,1-Trichloroethane (TCA)		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
1,1,2,2-Tetrachloroethane		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
1,1,2-Trichloroethane		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
1,1-Dichloroethane		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
1,1-Dichloroethene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
1,2,3-Trichlorobenzene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
1,2,4-Trichlorobenzene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
1,2,4-Trimethylbenzene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
1,2-Dichlorobenzene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
1,2-Dichloroethane (1,2-DCA)		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Di-isopropyl ether (DIPE)		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
1,2-Dichloropropane		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
1,3,5-Trimethylbenzene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
1,3-Dichlorobenzene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
1,3-Dichloropropane		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
1,4-Dichlorobenzene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
2,2-Dichloropropane		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
2-Chloroethylvinyl ether		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
2-Chlorotoluene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2

MOORE TWINING ASSOCIATES, INC.

California ELAP Certificate #1371

2527 Fresno Street
Fresno, CA 93721
(559) 268-7021 Phone
(559) 268-0740 Fax

City of Lodi
1331 South Ham Lane
Lodi CA, 95242

Project: Drinking Water- EDT
Project Number: Drinking Water
Project Manager: Andrew Richle

Reported:
02/15/13 09:32

Treated Water

3A29032-01 (Surface Water) Sampled:01/29/13 09:20

Analyte	Notes.	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Volatile Organics									
4-Chlorotoluene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Benzene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Bromobenzene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Bromochloromethane		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Bromodichloromethane		**0.88**	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Bromoform		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Bromomethane		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Carbon tetrachloride		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Chlorobenzene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Chloroethane		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Chloroform		**8.2**	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Chloromethane		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
cis-1,2-Dichloroethene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
cis-1,3-Dichloropropene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Dibromochloromethane		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Dibromomethane		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Dichlorodifluoromethane (CFC-12)		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Ethyl tert-Butyl Ether (ETBE)		ND	3.0	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Ethylbenzene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Hexachlorobutadiene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Isobutyl alcohol		ND	10	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Isopropylbenzene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
m,p-Xylene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Methyl tert-Butyl Ether (MTBE)		ND	3.0	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Methylene chloride		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
n-Butylbenzene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
n-Propylbenzene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
o-Xylene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
p-Isopropyltoluene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
sec-Butylbenzene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Styrene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Tert-Amyl Methyl Ether (TAME)		ND	3.0	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
tert-Butyl alcohol (TBA)		ND	2.0	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2

MOORE TWINING ASSOCIATES, INC.

California ELAP Certificate #1371

2527 Fresno Street
Fresno, CA 93721
(559) 268-7021 Phone
(559) 268-0740 Fax

City of Lodi
1331 South Ham Lane
Lodi CA, 95242

Project: Drinking Water- EDT
Project Number: Drinking Water
Project Manager: Andrew Richle

Reported:
02/15/13 09:32

Treated Water

3A29032-01 (Surface Water) Sampled:01/29/13 09:20

Analyte	Notes.	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Volatile Organics									
tert-Butylbenzene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Tetrachloroethene (PCE)		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Toluene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
trans-1,2-Dichloroethene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
trans-1,3-Dichloropropene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Trichloroethene (TCE)		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Trichlorofluoromethane (CFC-11)		ND	5.0	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Trichlorotrifluoroethane (CFC-113)		ND	10	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Vinyl chloride		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Xylenes		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Total 1,3-Dichloropropene		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Total Trihalomethanes		ND	0.50	µg/L	1	T3B0409	02/04/13	02/04/13	EPA 524.2
Surrogate: 4-Bromofluorobenzene		*99.5 %*	*80-120*			*T3B0409*	*02/04/13*	*02/04/13*	*EPA 524.2*
Surrogate: Dibromofluoromethane		*100 %*	*80-120*			*T3B0409*	*02/04/13*	*02/04/13*	*EPA 524.2*
Surrogate: Toluene-d8		*96.0 %*	*80-120*			*T3B0409*	*02/04/13*	*02/04/13*	*EPA 524.2*

Notes and Definitions

ug/L	micrograms per liter (parts per billion concentration units)
mg/kg	milligrams per kilogram (parts per million concentration units)
mg/L	milligrams per Liter (parts per million concentration units)
ND	Analyte NOT DETECTED at or above the reporting limit
RPD	Relative Percent Difference
	Analysis of pH, filtration, and residual chlorine is to take place immediately after sampling in the field. If the test was performed in the laboratory, the hold time was exceeded.

MOORE TWINING ASSOCIATES, INC.

California ELAP Certificate #1371

2527 Fresno Street
Fresno, CA 93721
(559) 268-7021 Phone
(559) 268-0740 Fax

City of Lodi
1331 South Ham Lane
Lodi CA, 95242

Project: Drinking Water- EDT
Project Number: Drinking Water
Project Manager: Andrew Richle

Reported:
02/15/13 09:32

Semi-Volatile Organics - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T3B0401 - EPA 531.2										
Blank (T3B0401-BLK1)	Prepared & Analyzed: 02/04/13									
Surrogate: BDMC	*9.43*		*µg/L*	*10.0*		*94.3*	*70-130*			
3-Hydroxycarbofuran	ND	3.0	µg/L							
Aldicarb	ND	3.0	µg/L							
Aldicarb sulfone	ND	4.0	µg/L							
Aldicarb sulfoxide	ND	3.0	µg/L							
Carbaryl	ND	5.0	µg/L							
Carbofuran	ND	5.0	µg/L							
Methiocarb	ND	5.0	µg/L							
Methomyl	ND	2.0	µg/L							
Oxamyl	ND	20	µg/L							
Propoxur (Baygon)	ND	5.0	µg/L							
LCS (T3B0401-BS1)	Prepared & Analyzed: 02/04/13									
Surrogate: BDMC	*10.5*		*µg/L*	*10.0*		*105*	*70-130*			
3-Hydroxycarbofuran	10.4	3.0	µg/L	10.0		104	70-130		30	
Aldicarb	10.5	3.0	µg/L	10.0		105	70-130		30	
Aldicarb sulfone	10.3	4.0	µg/L	10.0		103	70-130		30	
Aldicarb sulfoxide	9.60	3.0	µg/L	10.0		96.0	70-130		30	
Carbaryl	10.4	5.0	µg/L	10.0		104	70-130		30	
Carbofuran	10.6	5.0	µg/L	10.0		106	70-130		30	
Methiocarb	10.4	5.0	µg/L	10.0		104	70-130		30	
Methomyl	10.0	2.0	µg/L	10.0		100	70-130		30	
Oxamyl	9.96	20	µg/L	10.0		99.6	70-130		30	
Propoxur (Baygon)	10.2	5.0	µg/L	10.0		102	70-130		30	
LCS Dup (T3B0401-BSD1)	Prepared & Analyzed: 02/04/13									
Surrogate: BDMC	*10.6*		*µg/L*	*10.0*		*106*	*70-130*			
3-Hydroxycarbofuran	10.5	3.0	µg/L	10.0		105	70-130	1.16	30	
Aldicarb	10.6	3.0	µg/L	10.0		106	70-130	0.723	30	
Aldicarb sulfone	10.3	4.0	µg/L	10.0		103	70-130	0.185	30	
Aldicarb sulfoxide	9.62	3.0	µg/L	10.0		96.2	70-130	0.281	30	
Carbaryl	10.5	5.0	µg/L	10.0		105	70-130	0.739	30	
Carbofuran	10.8	5.0	µg/L	10.0		108	70-130	2.03	30	
Methiocarb	10.4	5.0	µg/L	10.0		104	70-130	0.760	30	
Methomyl	10.1	2.0	µg/L	10.0		101	70-130	0.537	30	
Oxamyl	10.0	20	µg/L	10.0		100	70-130	0.391	30	

MOORE TWINING ASSOCIATES, INC.

California ELAP Certificate #1371

2527 Fresno Street
Fresno, CA 93721
(559) 268-7021 Phone
(559) 268-0740 Fax

City of Lodi
1331 South Ham Lane
Lodi CA, 95242

Project: Drinking Water- EDT
Project Number: Drinking Water
Project Manager: Andrew Richle

Reported:
02/15/13 09:32

Semi-Volatile Organics - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T3B0401 - EPA 531.2										
LCS Dup (T3B0401-BSD1)				Prepared & Analyzed: 02/04/13						
Propoxur (Baygon)	10.3	5.0	µg/L	10.0		103	70-130	0.555	30	
Matrix Spike (T3B0401-MS1)		**Source: 3A29030-01**		Prepared & Analyzed: 02/04/13						
Surrogate: BDMC	*10.7*		*µg/L*	*10.0*		*107*	*70-130*			
3-Hydroxycarbofuran	10.4	3.0	µg/L	10.0	ND	104	70-130		30	
Aldicarb	10.5	3.0	µg/L	10.0	ND	105	70-130		30	
Aldicarb sulfone	10.1	4.0	µg/L	10.0	ND	101	70-130		30	
Aldicarb sulfoxide	9.49	3.0	µg/L	10.0	ND	94.9	70-130		30	
Carbaryl	10.3	5.0	µg/L	10.0	ND	103	70-130		30	
Carbofuran	10.6	5.0	µg/L	10.0	ND	106	70-130		30	
Methiocarb	9.92	5.0	µg/L	10.0	ND	99.2	70-130		30	
Methomyl	9.98	2.0	µg/L	10.0	ND	99.8	70-130		30	
Oxamyl	9.90	20	µg/L	10.0	ND	99.0	70-130		30	
Propoxur (Baygon)	10.0	5.0	µg/L	10.0	ND	100	70-130		30	
Matrix Spike Dup (T3B0401-MSD1)		**Source: 3A29030-01**		Prepared & Analyzed: 02/04/13						
Surrogate: BDMC	*10.5*		*µg/L*	*10.0*		*105*	*70-130*			
3-Hydroxycarbofuran	10.4	3.0	µg/L	10.0	ND	104	70-130	0.433	30	
Aldicarb	10.5	3.0	µg/L	10.0	ND	105	70-130	0.286	30	
Aldicarb sulfone	10.1	4.0	µg/L	10.0	ND	101	70-130	0.297	30	
Aldicarb sulfoxide	9.49	3.0	µg/L	10.0	ND	94.9	70-130	0.0211	30	
Carbaryl	10.3	5.0	µg/L	10.0	ND	103	70-130	0.593	30	
Carbofuran	10.3	5.0	µg/L	10.0	ND	103	70-130	3.34	30	
Methiocarb	9.89	5.0	µg/L	10.0	ND	98.9	70-130	0.313	30	
Methomyl	10.1	2.0	µg/L	10.0	ND	101	70-130	1.19	30	
Oxamyl	9.95	20	µg/L	10.0	ND	99.5	70-130	0.453	30	
Propoxur (Baygon)	10.0	5.0	µg/L	10.0	ND	100	70-130	0.429	30	

MOORE TWINING ASSOCIATES, INC.

California ELAP Certificate #1371

2527 Fresno Street
Fresno, CA 93721
(559) 268-7021 Phone
(559) 268-0740 Fax

City of Lodi
1331 South Ham Lane
Lodi CA, 95242

Project: Drinking Water- EDT
Project Number: Drinking Water
Project Manager: Andrew Richle

Reported:
02/15/13 09:32

Volatile Organics - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T3B0409 - EPA 524.2										
Blank (T3B0409-BLK1)	Prepared & Analyzed: 02/04/13									
Surrogate: 4-Bromofluorobenzene	*1.99*		*µg/L*	*2.00*		*99.5*	*80-120*			
Surrogate: Dibromofluoromethane	*1.96*		*µg/L*	*2.00*		*98.0*	*80-120*			
Surrogate: Toluene-d8	*1.90*		*µg/L*	*2.00*		*95.0*	*80-120*			
1,1,1,2-Tetrachloroethane	ND	0.50	µg/L							
1,1,1-Trichloroethane (TCA)	ND	0.50	µg/L							
1,1,2,2-Tetrachloroethane	ND	0.50	µg/L							
1,1,2-Trichloroethane	ND	0.50	µg/L							
1,1-Dichloroethane	ND	0.50	µg/L							
1,1-Dichloroethene	ND	0.50	µg/L							
1,2,3-Trichlorobenzene	ND	0.50	µg/L							
1,2,4-Trichlorobenzene	ND	0.50	µg/L							
1,2,4-Trimethylbenzene	ND	0.50	µg/L							
1,2-Dichlorobenzene	ND	0.50	µg/L							
1,2-Dichloroethane (1,2-DCA)	ND	0.50	µg/L							
Di-isopropyl ether (DIPE)	ND	0.50	µg/L							
1,2-Dichloropropane	ND	0.50	µg/L							
1,3,5-Trimethylbenzene	ND	0.50	µg/L							
1,3-Dichlorobenzene	ND	0.50	µg/L							
1,3-Dichloropropane	ND	0.50	µg/L							
1,4-Dichlorobenzene	ND	0.50	µg/L							
2,2-Dichloropropane	ND	0.50	µg/L							
2-Chloroethylvinyl ether	ND	0.50	µg/L							
2-Chlorotoluene	ND	0.50	µg/L							
4-Chlorotoluene	ND	0.50	µg/L							
Benzene	ND	0.50	µg/L							
Bromobenzene	ND	0.50	µg/L							
Bromochloromethane	ND	0.50	µg/L							
Bromodichloromethane	ND	0.50	µg/L							
Bromoform	ND	0.50	µg/L							
Bromomethane	ND	0.50	µg/L							
Carbon tetrachloride	ND	0.50	µg/L							
Chlorobenzene	ND	0.50	µg/L							
Chloroethane	ND	0.50	µg/L							
Chloroform	ND	0.50	µg/L							
Chloromethane	ND	0.50	µg/L							

MOORE TWINING ASSOCIATES, INC.

California ELAP Certificate #1371

2527 Fresno Street
Fresno, CA 93721
(559) 268-7021 Phone
(559) 268-0740 Fax

City of Lodi
1331 South Ham Lane
Lodi CA, 95242

Project: Drinking Water- EDT
Project Number: Drinking Water
Project Manager: Andrew Richle

Reported:
02/15/13 09:32

Volatile Organics - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T3B0409 - EPA 524.2										
Blank (T3B0409-BLK1)				Prepared & Analyzed: 02/04/13						
cis-1,2-Dichloroethene	ND	0.50	µg/L							
cis-1,3-Dichloropropene	ND	0.50	µg/L							
Dibromochloromethane	ND	0.50	µg/L							
Dibromomethane	ND	0.50	µg/L							
Dichlorodifluoromethane (CFC-12)	ND	0.50	µg/L							
Ethyl tert-Butyl Ether (ETBE)	ND	3.0	µg/L							
Ethylbenzene	ND	0.50	µg/L							
Hexachlorobutadiene	ND	0.50	µg/L							
Isobutyl alcohol	ND	10	µg/L							
Isopropylbenzene	ND	0.50	µg/L							
m,p-Xylene	ND	0.50	µg/L							
Methyl tert-Butyl Ether (MTBE)	ND	3.0	µg/L							
Methylene chloride	ND	0.50	µg/L							
n-Butylbenzene	ND	0.50	µg/L							
n-Propylbenzene	ND	0.50	µg/L							
o-Xylene	ND	0.50	µg/L							
p-Isopropyltoluene	ND	0.50	µg/L							
sec-Butylbenzene	ND	0.50	µg/L							
Styrene	ND	0.50	µg/L							
Tert-Amyl Methyl Ether (TAME)	ND	3.0	µg/L							
tert-Butyl alcohol (TBA)	ND	2.0	µg/L							
tert-Butylbenzene	ND	0.50	µg/L							
Tetrachloroethene (PCE)	ND	0.50	µg/L							
Toluene	ND	0.50	µg/L							
trans-1,2-Dichloroethene	ND	0.50	µg/L							
trans-1,3-Dichloropropene	ND	0.50	µg/L							
Trichloroethene (TCE)	ND	0.50	µg/L							
Trichlorofluoromethane (CFC-11)	ND	5.0	µg/L							
Trichlorotrifluoroethane (CFC-113)	ND	10	µg/L							
Vinyl chloride	ND	0.50	µg/L							
Xylenes	ND	0.50	µg/L							
Total 1,3-Dichloropropene	ND	0.50	µg/L							
Total Trihalomethanes	ND	0.50	µg/L							
LCS (T3B0409-BS1)				Prepared & Analyzed: 02/04/13						

MOORE TWINING ASSOCIATES, INC.

California ELAP Certificate #1371

2527 Fresno Street
Fresno, CA 93721
(559) 268-7021 Phone
(559) 268-0740 Fax

City of Lodi
1331 South Ham Lane
Lodi CA, 95242

Project: Drinking Water- EDT
Project Number: Drinking Water
Project Manager: Andrew Richle

Reported:
02/15/13 09:32

Volatile Organics - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch T3B0409 - EPA 524.2										
LCS (T3B0409-BS1)	Prepared & Analyzed: 02/04/13									
Surrogate: 4-Bromofluorobenzene	*1.92*		*µg/L*	*2.00*		*96.0*	*70-130*			
Surrogate: Dibromofluoromethane	*2.14*		*µg/L*	*2.00*		*107*	*70-130*			
Surrogate: Toluene-d8	*1.93*		*µg/L*	*2.00*		*96.5*	*70-130*			
1,1-Dichloroethene	4.90	0.50	µg/L	5.00		98.0	70-130		20	
Benzene	4.80	0.50	µg/L	5.00		96.0	70-130		20	
Chlorobenzene	4.87	0.50	µg/L	5.00		97.4	70-130		20	
Toluene	4.86	0.50	µg/L	5.00		97.2	70-130		20	
Trichloroethene (TCE)	4.66	0.50	µg/L	5.00		93.2	70-130		20	
LCS Dup (T3B0409-BSD1)	Prepared & Analyzed: 02/04/13									
Surrogate: 4-Bromofluorobenzene	*1.99*		*µg/L*	*2.00*		*99.5*	*70-130*			
Surrogate: Dibromofluoromethane	*2.04*		*µg/L*	*2.00*		*102*	*70-130*			
Surrogate: Toluene-d8	*2.00*		*µg/L*	*2.00*		*100*	*70-130*			
1,1-Dichloroethene	5.01	0.50	µg/L	5.00		100	70-130	2.22	20	
Benzene	4.96	0.50	µg/L	5.00		99.2	70-130	3.28	20	
Chlorobenzene	5.15	0.50	µg/L	5.00		103	70-130	5.59	20	
Toluene	5.08	0.50	µg/L	5.00		102	70-130	4.43	20	
Trichloroethene (TCE)	4.90	0.50	µg/L	5.00		98.0	70-130	5.02	20	

Date of Report: 02/14/2013

Julio Morales

Moore-Twining Associates
2527 Fresno Street
Fresno, CA 93720

Project: Drinking Water-EDT
BC Work Order: 1302107
Invoice ID: B139931

Enclosed are the results of analyses for samples received by the laboratory on 1/30/2013. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Contact Person: Natalie Serda
Client Service Rep

Authorized Signature

Table of Contents

Chain of Custody and Cooler Receipt Form for 1302107 Page 1 of 2

MOORE TWINING **SUBCONTRACT ORDER - Purchase Order # 18170**

California ELAP Certification # 1371 # 13-02107 **MTA Project # 3A29032**

Please reference these numbers on all reports and invoices:
We also request QC data be provided with final report.

SENDING LABORATORY:

Moore Twining Associates, Inc.
2527 Fresno Street
Fresno, CA 93721
Phone: (559) 268-7021
Fax: (559) 268-0740
Project Manager: Julio Morales

RECEIVING LABORATORY:

BC Laboratories, Inc.
4100 Atlas Court
Bakersfield, CA 93308
Phone :(800) 878-4911
Fax: (661) 327-1918

Please TAT

Sample Comments

Client Sample ID#: Treated Water -1

MTA Sample ID: 3A29032-01 Matrix: Water **Sampled: 01/29/13 09:20** **Report Due to Client: 02/12/13**

Requested Analysis: 549.2 Title 22	Holding time expires: 02/05/13 09:20
Requested Analysis: 548.1 Title 22 (Sub)	Holding time expires: 02/05/13 09:20
Requested Analysis: 525.2	Holding time expires: 02/12/13 09:20
Requested Analysis: 515.1 Title 22	Holding time expires: 02/12/13 09:20

Containers Supplied:

250mL Amber Glass w/ Thio (B)	250mL Amber Glass w/ Thio (C)	1L Amber Glass w/ Thio (D)	1L Amber Glass w/ Thio (E)

3910004-049

CHK BY BLT DISTRIBUTION SUB-OUT

Released By	Date 1/30/13	Received By	Date 1-30-13 15:05
Released By	Date 1-30-13 21:40	Received By	Date 1-30-13 2140

Please fax copy of receipt with your assigned sample ID number to (559) 268-0740 Page 1 of 1

Chain of Custody and Cooler Receipt Form for 1302107 Page 2 of 2

BC LABORATORIES INC. COOLER RECEIPT FORM Rev. No. 13 08/17/12 Page 1 Of 1

Submission #: 13-02107

SHIPPING INFORMATION	SHIPPING CONTAINER
Federal Express ☐ UPS ☐ Hand Delivery ☐	Ice Chest ☑ None ☐
BC Lab Field Service ☑ Other ☐ (Specify)_____	Box ☐ Other ☐ (Specify)_____

Refrigerant: Ice ☑ Blue Ice ☐ None ☐ Other ☐ Comments:

Custody Seals: Ice Chest ☐ Intact? Yes ☐ No ☐ | Containers ☐ Intact? Yes ☐ No ☐ | None ☑ Comments:

All samples received? Yes ☑ No ☐ All samples containers intact? Yes ☑ No ☐ Description(s) match COC? Yes ☑ No ☐

COC Received ☑ YES ☐ NO

Emissivity: 0.97 Container: 4oz jar Thermometer ID: 207 Date/Time 1-30-13

Temperature: (A) 4.8 °C / (C) 4.9 °C Analyst Init JNW 2200

SAMPLE CONTAINERS	SAMPLE NUMBERS 1	2	3	4	5	6	7	8	9	10
QT GENERAL MINERAL/ GENERAL PHYSICAL										
PT PE UNPRESERVED										
QT INORGANIC CHEMICAL METALS										
PT INORGANIC CHEMICAL METALS										
PT CYANIDE										
PT NITROGEN FORMS										
PT TOTAL SULFIDE										
2oz. NITRATE / NITRITE										
PT TOTAL ORGANIC CARBON										
PT TOX										
PT CHEMICAL OXYGEN DEMAND										
PtA PHENOLICS										
40ml VOA VIAL TRAVEL BLANK										
40ml VOA VIAL										
QT EPA 413.1, 4132, 418.1										
PT ODOR										
RADIOLOGICAL										
BACTERIOLOGICAL										
40 ml VOA VIAL-504										
QT EPA 508/608/8080										
QT EPA 515.1/8150										
QT EPA 525	A,B									
QT EPA 525 TRAVEL BLANK										
100ml EPA 547										
100ml EPA 531.1										
QT EPA 548 8oz	C									
QT EPA 549 8oz	D									
QT EPA 632										
QT EPA 8015M										
QT AMBER										
8 OZ. JAR										
32 OZ. JAR										
SOIL SLEEVE										
PCB VIAL										
PLASTIC BAG										
FERROUS IRON										
ENCORE										
SMART KIT										

Comments:

Sample Numbering Completed By: BLT Date/Time: 1-31-13 @ 0850

Moore-Twining Associates
2527 Fresno Street
Fresno, CA 93720

Reported: 02/14/2013 10:31
Project: Drinking Water-EDT
Project Number: 3A29032
Project Manager: Julio Morales

Laboratory / Client Sample Cross Reference

Laboratory	Client Sample Information			
1302107-01	**COC Number:**	---	**Receive Date:**	01/30/2013 21:40
	Project Number:	---	**Sampling Date:**	01/29/2013 09:20
	Sampling Location:	---	**Sample Depth:**	---
	Sampling Point:	Treated Water 3A29032-01	**Lab Matrix:**	Water
	Sampled By:	---	**Sample Type:**	Water
			District ID: PTA	
			System Number: 3910004	
			Station Number: 3910004-049	
			Holding Times Met:	

Moore-Twining Associates
2527 Fresno Street
Fresno, CA 93720

Reported: 02/14/2013 10:31
Project: Drinking Water-EDT
Project Number: 3A29032
Project Manager: Julio Morales

Organic Analysis (EPA Method 515.1)

BCL Sample ID: 1302107-01 | **Client Sample Name:** Treated Water 3A29032-01, 1/29/2013 9:20:00AM

Constituent	Result	Units	PQL	Method	MB Bias	Lab Quals	Run #
Bentazon	<0.80	ug/L	0.80	EPA-515.1	ND		1
2,4-D	<0.40	ug/L	0.40	EPA-515.1	ND		1
Dalapon	<5.0	ug/L	5.0	EPA-515.1	ND		1
Dicamba	<0.080	ug/L	0.080	EPA-515.1	ND		1
Dinoseb	<0.20	ug/L	0.20	EPA-515.1	ND		1
Pentachlorophenol	<0.050	ug/L	0.050	EPA-515.1	ND		1
Picloram	<0.050	ug/L	0.050	EPA-515.1	ND		1
2,4,5-TP (Silvex)	<0.070	ug/L	0.070	EPA-515.1	ND		1
2,4-Dichlorophenylacetic acid (Surrogate)	96.0	%	30 - 140 (LCL - UCL)	EPA-515.1			1

Run #	Method	Prep Date	Run Date/Time	Analyst	Instrument	Dilution	QC Batch ID
1	EPA-515.1	02/02/13	02/09/13 10:58	mk1	GC-8	1	BWB0287

Moore-Twining Associates
2527 Fresno Street
Fresno, CA 93720

Reported: 02/14/2013 10:31
Project: Drinking Water-EDT
Project Number: 3A29032
Project Manager: Julio Morales

Organic Analysis by Liquid Solids Extraction (EPA Method 525.2)

BCL Sample ID: 1302107-01 | **Client Sample Name:** Treated Water 3A29032-01, 1/29/2013 9:20:00AM

Constituent	Result	Units	PQL	Method	MB Bias	Lab Quals	Run #
Acenaphthylene	<0.10	ug/L	0.10	EPA-525.2	ND		1
Alachlor	<0.20	ug/L	0.20	EPA-525.2	ND		1
Anthracene	<0.10	ug/L	0.10	EPA-525.2	ND		1
Atraton	<0.50	ug/L	0.50	EPA-525.2	ND		1
Atrazine	<0.30	ug/L	0.30	EPA-525.2	ND		1
Benzo[a]anthracene	<0.20	ug/L	0.20	EPA-525.2	ND		1
Benzo[b]fluoranthene	<0.30	ug/L	0.30	EPA-525.2	ND		1
Benzo[k]fluoranthene	<0.30	ug/L	0.30	EPA-525.2	ND		1
Benzo[a]pyrene	<0.10	ug/L	0.10	EPA-525.2	ND		1
Benzo[g,h,i]perylene	<0.30	ug/L	0.30	EPA-525.2	ND		1
Benzyl butyl phthalate	<4.0	ug/L	4.0	EPA-525.2	ND		1
delta-BHC	<0.20	ug/L	0.20	EPA-525.2	ND		1
gamma-BHC (Lindane)	<0.10	ug/L	0.10	EPA-525.2	ND		1
bis(2-Ethylhexyl)phthalate	<3.0	ug/L	3.0	EPA-525.2	ND		1
Bromacil	<0.50	ug/L	0.50	EPA-525.2	ND		1
Chrysene	<0.30	ug/L	0.30	EPA-525.2	ND		1
Diazinon	<0.20	ug/L	0.20	EPA-525.2	ND		1
Dibenzo[a,h]anthracene	<0.30	ug/L	0.30	EPA-525.2	ND		1
Di(2-ethylhexyl)adipate	<1.0	ug/L	1.0	EPA-525.2	ND		1
Dimethoate	<2.0	ug/L	2.0	EPA-525.2	ND		1
Dimethyl phthalate	<1.0	ug/L	1.0	EPA-525.2	ND		1
Di-n-butyl phthalate	<1.0	ug/L	1.0	EPA-525.2	ND		1
Fluorene	<0.20	ug/L	0.20	EPA-525.2	ND		1
Hexachlorobenzene	<0.10	ug/L	0.10	EPA-525.2	ND		1
Hexachlorocyclopentadiene	<1.0	ug/L	1.0	EPA-525.2	ND		1
Indeno[1,2,3-cd]pyrene	<0.30	ug/L	0.30	EPA-525.2	ND		1
Methoxychlor	<0.30	ug/L	0.30	EPA-525.2	ND		1
Metolachlor	<0.50	ug/L	0.50	EPA-525.2	ND		1
Metribuzin	<0.50	ug/L	0.50	EPA-525.2	ND		1
Molinate	<0.50	ug/L	0.50	EPA-525.2	ND		1
Phenanthrene	<0.10	ug/L	0.10	EPA-525.2	ND		1
Prometon	<0.50	ug/L	0.50	EPA-525.2	ND		1
Prometryn	<0.50	ug/L	0.50	EPA-525.2	ND		1

Moore-Twining Associates
2527 Fresno Street
Fresno, CA 93720

Reported: 02/14/2013 10:31
Project: Drinking Water-EDT
Project Number: 3A29032
Project Manager: Julio Morales

Organic Analysis by Liquid Solids Extraction (EPA Method 525.2)

BCL Sample ID: 1302107-01 | **Client Sample Name:** Treated Water 3A29032-01, 1/29/2013 9:20:00AM

Constituent	Result	Units	PQL	Method	MB Bias	Lab Quals	Run #
Pyrene	<0.10	ug/L	0.10	EPA-525.2	ND		1
Secbumeton	<0.50	ug/L	0.50	EPA-525.2	ND		1
Simazine	<0.30	ug/L	0.30	EPA-525.2	ND		1
Terbutryn	<0.50	ug/L	0.50	EPA-525.2	ND		1
Thiobencarb	<0.50	ug/L	0.50	EPA-525.2	ND		1
Perylene-d12 (Surrogate)	192	%	60 - 130 (LCL - UCL)	EPA-525.2		S09	1
1,3-Dimethyl-2-nitrobenzene (Surrogate)	98.6	%	70 - 130 (LCL - UCL)	EPA-525.2			1
Triphenylphosphate (Surrogate)	133	%	70 - 130 (LCL - UCL)	EPA-525.2		S09	1

Run #	Method	Prep Date	Run Date/Time	Analyst	Instrument	Dilution	QC Batch ID
1	EPA-525.2	02/05/13	02/13/13 00:36	SKC	HPCHEM	1	BWB0494

Moore-Twining Associates
2527 Fresno Street
Fresno, CA 93720

Reported: 02/14/2013 10:31
Project: Drinking Water-EDT
Project Number: 3A29032
Project Manager: Julio Morales

Organic Analysis for Endothal (EPA Method 548.1)

BCL Sample ID: 1302107-01 | **Client Sample Name:** Treated Water 3A29032-01, 1/29/2013 9:20:00AM

Constituent	Result	Units	PQL	Method	MB Bias	Lab Quals	Run #
Endothal	<20	ug/L	20	EPA-548.1	ND		1

Run #	Method	Prep Date	Run Date/Time	Analyst	Instrument	Dilution	QC Batch ID
1	EPA-548.1	02/05/13	02/12/13 19:27	spb	MS-B3	1	BWB0454

Moore-Twining Associates
2527 Fresno Street
Fresno, CA 93720

Reported: 02/14/2013 10:31
Project: Drinking Water-EDT
Project Number: 3A29032
Project Manager: Julio Morales

Organic Analysis for Herbicides (EPA Method 549)

BCL Sample ID: 1302107-01 | **Client Sample Name:** Treated Water 3A29032-01, 1/29/2013 9:20:00AM

Constituent	Result	Units	PQL	Method	MB Bias	Lab Quals	Run #
Diquat	<4.0	ug/L	4.0	EPA-549.2	ND		1

Run #	Method	Prep Date	Run Date/Time	Analyst	Instrument	Dilution	QC Batch ID
1	EPA-549.2	02/05/13	02/12/13 14:33	MK1	LC-14	1	BWB0488

Moore-Twining Associates
2527 Fresno Street
Fresno, CA 93720

Reported: 02/14/2013 10:31
Project: Drinking Water-EDT
Project Number: 3A29032
Project Manager: Julio Morales

Organic Analysis (EPA Method 515.1)

Quality Control Report - Method Blank Analysis

Constituent	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
QC Batch ID: BWB0287						
Bentazon	BWB0287-BLK1	<0.80	ug/L	0.80		
2,4-D	BWB0287-BLK1	<0.40	ug/L	0.40		
Dalapon	BWB0287-BLK1	<5.0	ug/L	5.0		
Dicamba	BWB0287-BLK1	<0.080	ug/L	0.080		
Dinoseb	BWB0287-BLK1	<0.20	ug/L	0.20		
Pentachlorophenol	BWB0287-BLK1	<0.050	ug/L	0.050		
Picloram	BWB0287-BLK1	<0.050	ug/L	0.050		
2,4,5-TP (Silvex)	BWB0287-BLK1	<0.070	ug/L	0.070		
2,4-Dichlorophenylacetic acid (Surrogate)	BWB0287-BLK1	66.0	%	30 - 140 (LCL - UCL)		

Moore-Twining Associates
2527 Fresno Street
Fresno, CA 93720

Reported: 02/14/2013 10:31
Project: Drinking Water-EDT
Project Number: 3A29032
Project Manager: Julio Morales

Organic Analysis (EPA Method 515.1)

Quality Control Report - Laboratory Control Sample

Constituent	QC Sample ID	Type	Result	Spike Level	Units	Percent Recovery	RPD	Control Limits Percent Recovery	Control Limits RPD	Lab Quals
QC Batch ID: BWB0287										
2,4-D	BWB0287-BS1	LCS	2.1900	2.4000	ug/L	91.2		60 - 130		
Dicamba	BWB0287-BS1	LCS	0.56000	0.60000	ug/L	93.3		50 - 120		
Dinoseb	BWB0287-BS1	LCS	1.3300	1.2000	ug/L	111		40 - 120		
2,4,5-TP (Silvex)	BWB0287-BS1	LCS	0.70000	0.60000	ug/L	117		50 - 130		
2,4-Dichlorophenylacetic acid (Surrogate)	BWB0287-BS1	LCS	0.76000	1.0000	ug/L	76.0		30 - 140		

Moore-Twining Associates
2527 Fresno Street
Fresno, CA 93720

Reported: 02/14/2013 10:31
Project: Drinking Water-EDT
Project Number: 3A29032
Project Manager: Julio Morales

Organic Analysis (EPA Method 515.1)

Quality Control Report - Precision & Accuracy

Constituent	Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	Control Limits RPD	Control Limits Percent Recovery	Lab Quals
QC Batch ID: BWB0287	Used client sample: N										
2,4-D	MS	1225032-94	ND	1.8400	2.4000	ug/L		76.7		50 - 130	
	MSD	1225032-94	ND	2.0600	2.4000	ug/L	11.3	85.8	30	50 - 130	
Dicamba	MS	1225032-94	ND	0.44000	0.60000	ug/L		73.3		50 - 120	
	MSD	1225032-94	ND	0.50000	0.60000	ug/L	12.8	83.3	30	50 - 120	
Dinoseb	MS	1225032-94	ND	1.1800	1.2000	ug/L		98.3		40 - 120	
	MSD	1225032-94	ND	1.4000	1.2000	ug/L	17.1	117	30	40 - 120	
2,4,5-TP (Silvex)	MS	1225032-94	ND	0.55000	0.60000	ug/L		91.7		50 - 130	
	MSD	1225032-94	ND	0.62000	0.60000	ug/L	12.0	103	30	50 - 130	
2,4-Dichlorophenylacetic acid (Surrogate	MS	1225032-94	ND	0.59000	1.0000	ug/L		59.0		30 - 140	
	MSD	1225032-94	ND	0.68000	1.0000	ug/L	14.2	68.0		30 - 140	

Moore-Twining Associates
2527 Fresno Street
Fresno, CA 93720

Reported: 02/14/2013 10:31
Project: Drinking Water-EDT
Project Number: 3A29032
Project Manager: Julio Morales

Organic Analysis by Liquid Solids Extraction (EPA Method 525.2)

Quality Control Report - Method Blank Analysis

Constituent	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
QC Batch ID: BWB0494						
Acenaphthylene	BWB0494-BLK1	<0.10	ug/L	0.10		
Alachlor	BWB0494-BLK1	<0.20	ug/L	0.20		
Anthracene	BWB0494-BLK1	<0.10	ug/L	0.10		
Atraton	BWB0494-BLK1	<0.50	ug/L	0.50		
Atrazine	BWB0494-BLK1	<0.30	ug/L	0.30		
Benzo[a]anthracene	BWB0494-BLK1	<0.20	ug/L	0.20		
Benzo[b]fluoranthene	BWB0494-BLK1	<0.30	ug/L	0.30		
Benzo[k]fluoranthene	BWB0494-BLK1	<0.30	ug/L	0.30		
Benzo[a]pyrene	BWB0494-BLK1	<0.10	ug/L	0.10		
Benzo[g,h,i]perylene	BWB0494-BLK1	<0.30	ug/L	0.30		
Benzyl butyl phthalate	BWB0494-BLK1	<4.0	ug/L	4.0		
delta-BHC	BWB0494-BLK1	<0.20	ug/L	0.20		
gamma-BHC (Lindane)	BWB0494-BLK1	<0.10	ug/L	0.10		
bis(2-Ethylhexyl)phthalate	BWB0494-BLK1	<3.0	ug/L	3.0		
Bromacil	BWB0494-BLK1	<0.50	ug/L	0.50		
Chrysene	BWB0494-BLK1	<0.30	ug/L	0.30		
Diazinon	BWB0494-BLK1	<0.20	ug/L	0.20		
Dibenzo[a,h]anthracene	BWB0494-BLK1	<0.30	ug/L	0.30		
Di(2-ethylhexyl)adipate	BWB0494-BLK1	<1.0	ug/L	1.0		
Dimethoate	BWB0494-BLK1	<2.0	ug/L	2.0		
Dimethyl phthalate	BWB0494-BLK1	<1.0	ug/L	1.0		
Di-n-butyl phthalate	BWB0494-BLK1	<1.0	ug/L	1.0		
Fluorene	BWB0494-BLK1	<0.20	ug/L	0.20		
Hexachlorobenzene	BWB0494-BLK1	<0.10	ug/L	0.10		
Hexachlorocyclopentadiene	BWB0494-BLK1	<1.0	ug/L	1.0		
Indeno[1,2,3-cd]pyrene	BWB0494-BLK1	<0.30	ug/L	0.30		
Methoxychlor	BWB0494-BLK1	<0.30	ug/L	0.30		
Metolachlor	BWB0494-BLK1	<0.50	ug/L	0.50		
Metribuzin	BWB0494-BLK1	<0.50	ug/L	0.50		
Molinate	BWB0494-BLK1	<0.50	ug/L	0.50		
Phenanthrene	BWB0494-BLK1	<0.10	ug/L	0.10		
Prometon	BWB0494-BLK1	<0.50	ug/L	0.50		
Prometryn	BWB0494-BLK1	<0.50	ug/L	0.50		
Pyrene	BWB0494-BLK1	<0.10	ug/L	0.10		

Moore-Twining Associates
2527 Fresno Street
Fresno, CA 93720

Reported: 02/14/2013 10:31
Project: Drinking Water-EDT
Project Number: 3A29032
Project Manager: Julio Morales

Organic Analysis by Liquid Solids Extraction (EPA Method 525.2)

Quality Control Report - Method Blank Analysis

Constituent	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
QC Batch ID: BWB0494						
Secbumeton	BWB0494-BLK1	<0.50	ug/L	0.50		
Simazine	BWB0494-BLK1	<0.30	ug/L	0.30		
Terbutryn	BWB0494-BLK1	<0.50	ug/L	0.50		
Thiobencarb	BWB0494-BLK1	<0.50	ug/L	0.50		
Perylene-d12 (Surrogate)	BWB0494-BLK1	173	%	60 - 130 (LCL - UCL)		S09
1,3-Dimethyl-2-nitrobenzene (Surrogate)	BWB0494-BLK1	99.0	%	70 - 130 (LCL - UCL)		
Triphenylphosphate (Surrogate)	BWB0494-BLK1	112	%	70 - 130 (LCL - UCL)		

Moore-Twining Associates
2527 Fresno Street
Fresno, CA 93720

Reported: 02/14/2013 10:31
Project: Drinking Water-EDT
Project Number: 3A29032
Project Manager: Julio Morales

Organic Analysis by Liquid Solids Extraction (EPA Method 525.2)

Quality Control Report - Laboratory Control Sample

Constituent	QC Sample ID	Type	Result	Spike Level	Units	Percent Recovery	RPD	Control Limits Percent Recovery	Control Limits RPD	Lab Quals
QC Batch ID: BWB0494										
Acenaphthylene	BWB0494-BS1	LCS	1.2400	2.0000	ug/L	62.0		60 - 130		
Alachlor	BWB0494-BS1	LCS	1.0000	2.0000	ug/L	50.0		70 - 130		L01
Atrazine	BWB0494-BS1	LCS	1.0000	2.0000	ug/L	50.0		60 - 130		L01
Benzo[a]pyrene	BWB0494-BS1	LCS	3.2300	2.0000	ug/L	162		70 - 130		L01
Chrysene	BWB0494-BS1	LCS	2.1900	2.0000	ug/L	110		70 - 130		
Pyrene	BWB0494-BS1	LCS	2.3200	2.0000	ug/L	116		70 - 130		
Simazine	BWB0494-BS1	LCS	0.97000	2.0000	ug/L	48.5		55 - 130		L01
Perylene-d12 (Surrogate)	BWB0494-BS1	LCS	10.030	5.0000	ug/L	201		60 - 130		S09
1,3-Dimethyl-2-nitrobenzene (Surrogate)	BWB0494-BS1	LCS	4.8800	5.0000	ug/L	97.6		70 - 130		
Triphenylphosphate (Surrogate)	BWB0494-BS1	LCS	4.9800	5.0000	ug/L	99.6		70 - 130		

Moore-Twining Associates
2527 Fresno Street
Fresno, CA 93720

Reported: 02/14/2013 10:31
Project: Drinking Water-EDT
Project Number: 3A29032
Project Manager: Julio Morales

Organic Analysis by Liquid Solids Extraction (EPA Method 525.2)

Quality Control Report - Precision & Accuracy

Constituent	Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	Control Limits RPD	Control Limits Percent Recovery	Lab Quals
QC Batch ID: BWB0494	Used client sample: N										
Acenaphthylene	MS	1225032-76	ND	1.2200	2.0000	ug/L		61.0		60 - 130	
	MSD	1225032-76	ND	1.2400	2.0000	ug/L	1.6	62.0	30	60 - 130	
Alachlor	MS	1225032-76	ND	0.93000	2.0000	ug/L		46.5		70 - 130	Q03
	MSD	1225032-76	ND	0.96000	2.0000	ug/L	3.2	48.0	30	70 - 130	Q03
Atrazine	MS	1225032-76	ND	0.98000	2.0000	ug/L		49.0		60 - 130	Q03
	MSD	1225032-76	ND	0.98000	2.0000	ug/L	0	49.0	30	60 - 130	Q03
Benzo[a]pyrene	MS	1225032-76	ND	3.0500	2.0000	ug/L		152		70 - 130	Q03
	MSD	1225032-76	ND	3.1600	2.0000	ug/L	3.5	158	30	70 - 130	Q03
Chrysene	MS	1225032-76	ND	2.1900	2.0000	ug/L		110		70 - 130	
	MSD	1225032-76	ND	2.1500	2.0000	ug/L	1.8	108	30	70 - 130	
Pyrene	MS	1225032-76	ND	2.2700	2.0000	ug/L		114		70 - 130	
	MSD	1225032-76	ND	2.4400	2.0000	ug/L	7.2	122	30	70 - 130	
Simazine	MS	1225032-76	ND	0.92000	2.0000	ug/L		46.0		55 - 130	Q03
	MSD	1225032-76	ND	0.89000	2.0000	ug/L	3.3	44.5	30	55 - 130	Q03
Perylene-d12 (Surrogate)	MS	1225032-76	ND	9.7900	5.0000	ug/L		196		60 - 130	S09
	MSD	1225032-76	ND	9.5000	5.0000	ug/L	3.0	190		60 - 130	S09
1,3-Dimethyl-2-nitrobenzene (Surrogate)	MS	1225032-76	ND	4.7700	5.0000	ug/L		95.4		70 - 130	
	MSD	1225032-76	ND	4.6500	5.0000	ug/L	2.5	93.0		70 - 130	
Triphenylphosphate (Surrogate)	MS	1225032-76	ND	5.6900	5.0000	ug/L		114		70 - 130	
	MSD	1225032-76	ND	5.5500	5.0000	ug/L	2.5	111		70 - 130	

Moore-Twining Associates
2527 Fresno Street
Fresno, CA 93720

Reported: 02/14/2013 10:31
Project: Drinking Water-EDT
Project Number: 3A29032
Project Manager: Julio Morales

Organic Analysis for Endothal (EPA Method 548.1)

Quality Control Report - Method Blank Analysis

Constituent	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
QC Batch ID: BWB0454						
Endothal	BWB0454-BLK1	<20	ug/L	20		

Moore-Twining Associates
2527 Fresno Street
Fresno, CA 93720

Reported: 02/14/2013 10:31
Project: Drinking Water-EDT
Project Number: 3A29032
Project Manager: Julio Morales

Organic Analysis for Endothal (EPA Method 548.1)

Quality Control Report - Laboratory Control Sample

Constituent	QC Sample ID	Type	Result	Spike Level	Units	Percent Recovery	RPD	Control Limits Percent Recovery	Control Limits RPD	Lab Quals
QC Batch ID: BWB0454										
Endothal	BWB0454-BS1	LCS	87.567	100.00	ug/L	87.6		70 - 130		

Moore-Twining Associates
2527 Fresno Street
Fresno, CA 93720

Reported: 02/14/2013 10:31
Project: Drinking Water-EDT
Project Number: 3A29032
Project Manager: Julio Morales

Organic Analysis for Endothal (EPA Method 548.1)

Quality Control Report - Precision & Accuracy

Constituent	Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	Control Limits RPD	Control Limits Percent Recovery	Lab Quals
QC Batch ID: BWB0454	Used client sample: N										
Endothal	MS	1225032-99	ND	103.88	100.00	ug/L		104		70 - 130	
	MSD	1225032-99	ND	84.147	100.00	ug/L	21.0	84.1	30	70 - 130	

Moore-Twining Associates
2527 Fresno Street
Fresno, CA 93720

Reported: 02/14/2013 10:31
Project: Drinking Water-EDT
Project Number: 3A29032
Project Manager: Julio Morales

Organic Analysis for Herbicides (EPA Method 549)

Quality Control Report - Method Blank Analysis

Constituent	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
QC Batch ID: BWB0488						
Diquat	BWB0488-BLK1	<4.0	ug/L	4.0		

Moore-Twining Associates
2527 Fresno Street
Fresno, CA 93720

Reported: 02/14/2013 10:31
Project: Drinking Water-EDT
Project Number: 3A29032
Project Manager: Julio Morales

Organic Analysis for Herbicides (EPA Method 549)

Quality Control Report - Laboratory Control Sample

Constituent	QC Sample ID	Type	Result	Spike Level	Units	Percent Recovery	RPD	Control Limits Percent Recovery	Control Limits RPD	Lab Quals
QC Batch ID: BWB0488										
Diquat	BWB0488-BS1	LCS	56.920	80.000	ug/L	71.2		70 - 130		

Moore-Twining Associates
2527 Fresno Street
Fresno, CA 93720

Reported: 02/14/2013 10:31
Project: Drinking Water-EDT
Project Number: 3A29032
Project Manager: Julio Morales

Organic Analysis for Herbicides (EPA Method 549)

Quality Control Report - Precision & Accuracy

Constituent	Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	Control Limits RPD	Control Limits Percent Recovery	Lab Quals
QC Batch ID: BWB0488	Used client sample: N										
Diquat	MS	1225032-94	ND	59.640	80.000	ug/L		74.6		70 - 130	
	MSD	1225032-94	ND	63.640	80.000	ug/L	6.5	79.6	30	70 - 130	

Moore-Twining Associates
2527 Fresno Street
Fresno, CA 93720

Reported: 02/14/2013 10:31
Project: Drinking Water-EDT
Project Number: 3A29032
Project Manager: Julio Morales

Notes And Definitions

MDL	Method Detection Limit
ND	Analyte Not Detected at or above the reporting limit
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
L01	The Laboratory Control Sample Water (LCSW) recovery is not within laboratory established control limits.
Q03	Matrix spike recovery(s) is(are) not within the control limits.
S09	The surrogate recovery on the sample for this compound was not within the control limits.

ORGANIC CHEMICAL ANALYSIS (9/99)

Date of Report: 13/02/14 Sample ID No.3A29032-01

Laboratory Signature Lab Director:

Name: MOORE TWINING ASSOCIATES, INC.

Name of Sampler:SM Employed By:

Date/Time Sample Collected:13/01/29/0920 | Date/Time Sample Received @ Lab:13/01/29/1555 | Date Analyses Completed:13/02/04

System Name:LODI, CITY OF | System Number: 3910004

Name or Number of Sample Source:SWTF - TREATED WATER

* User ID: PTA Station Number: 3910004-049 *

* Date/Time of Sample: |13|01|29|0920| (YY MM DD TTTT) Laboratory Code: 5802 *

* YY MM DD *

* Date Analysis completed: |13|02|04| *

* Submitted by:_____ Phone #:_____ *

REGULATED ORGANIC CHEMICALS

TEST METHOD	CHEMICAL ALL CHEMICALS REPORTED ug/L	ENTRY #	ANALYSES RESULTS	MCL ug/L	DLR ug/L
524.2	Total Trihalomethanes (TTHMs)	82080	ND	80	
524.2	Bromodichloromethane	32101	0.88		1.0
524.2	Bromoform	32104	ND		1.0
524.2	Chloroform (Trichloromethane)	32106	8.2		1.0
524.2	Dibromochloromethane	32105	ND		1.0
524.2	Benzene	34030	ND	1	.50
524.2	Carbon Tetrachloride	32102	ND	.5	.50
524.2	1,2-Dichlorobenzene (o-DCB)	34536	ND	600	.50
524.2	1,4-Dichlorobenzene (p-DCB)	34571	ND	5	.50
524.2	1,1-Dichloroethane (1,1-DCA)	34496	ND	5	.50
524.2	1,2-Dichloroethane (1,2-DCA)	34531	ND	.5	.50
524.2	1,1-Dichloroethylene (1,1-DCE)	34501	ND	6	.50
524.2	cis-1,2-Dichloroethylene (c-1,2-DCE)	77093	ND	6	.50
524.2	trans-1,2-Dichloroethylene (t-1,2-DCE)	34546	ND	10	.50
524.2	Dichloromethane (Methylene Chloride)	34423	ND	5	.50
524.2	1,2-Dichloropropane	34541	ND	5	.50
524.2	Total 1,3-Dichloropropene	34561	ND	.5	.50
524.2	Ethyl Benzene	34371	ND	300	.50
524.2	Methyl tert-Butyl Ether(MTBE)	46491	ND	5	3.00
524.2	Monochlorobenzene (Chlorobenzene)	34301	ND	70	.50
524.2	Styrene	77128	ND	100	.50
524.2	1,1,2,2-Tetrachloroethane	34516	ND	1	.50
524.2	Tetrachloroethylene (PCE)	34475	ND	5	.50
524.2	Toluene	34010	ND	150	.50
524.2	1,2,4-Trichlorobenzene	34551	ND	5	.50
524.2	1,1,1-Trichloroethane (1,1,1-TCA)	34506	ND	200	.50
524.2	1,1,2-Trichloroethane (1,1,2-TCA)	34511	ND	5	.50
524.2	Trichloroethylene (TCE)	39180	ND	5	.50
524.2	Trichlorofluoromethane (FREON 11)	34488	ND	150	5.00

REGULATED ORGANIC CHEMICALS CONTINUED 3A29032-01

TEST METHOD	CHEMICAL ALL CHEMICALS REPORTED ug/L	ENTRY #	ANALYSES RESULTS	MCL ug/L	DLR ug/L
524.2	Trichlorotrifluoroethane (FREON 113)	81611	ND	1200	10.00
524.2	Vinyl Chloride (VC)	39175	ND	.5	.50
524.2	m,p-Xylene	A-014	ND		.50
524.2	o-Xylene	77135	ND		.50
524.2	Total Xylenes (m,p, & o)	81551	ND	1750	
531.2	Carbofuran (FURADAN)	81405	ND	18	5.00
531.2	Oxamyl (Vydate)	38865	ND	50	20.00
	UNREGULATED ORGANIC CHEMICALS				
524.2	tert-Amyl Methyl Ether (TAME)	A-034	ND		3.00
524.2	Bromobenzene	81555	ND		.50
524.2	Bromochloromethane	A-012	ND		.50
524.2	Bromomethane (Methyl Bromide)	34413	ND		.50
524.2	tert-Butyl Alcohol (TBA)	77035	ND		2.00
524.2	n-Butylbenzene	A-010	ND		.50
524.2	sec-Butylbenzene	77350	ND		.50
524.2	tert-Butylbenzene	77353	ND		.50
524.2	Chloroethane	34311	ND		.50
524.2	2-Chloroethylvinyl Ether	34576	ND		
524.2	Chloromethane (Methyl Chloride)	34418	ND		.50
524.2	2-Chlorotoluene	A-008	ND		.50
524.2	4-Chlorotoluene	A-009	ND		.50
524.2	Dibromomethane	77596	ND		.50
524.2	1,3-Dichlorobenzene (m-DCB)	34566	ND		.50
524.2	Dichlorodifluoromethane (Freon 12)	34668	ND		0.50
524.2	1,3-Dichloropropane	77173	ND		.50
524.2	2,2-Dichloropropane	77170	ND		.50
524.2	Diisopropyl Ether (DIPE)	A-036	ND		3.00
524.2	Ethyl tert-Butyl Ether (ETBE)	A-033	ND		3.00
524.2	Hexachlorobutadiene	34391	ND		.50
524.2	Isopropylbenzene (Cumene)	77223	ND		.50
524.2	p-Isopropyltoluene	A-011	ND		
524.2	n-Propylbenzene	77224	ND		.50
524.2	1,1,1,2-Tetrachloroethane	77562	ND		.50
524.2	1,2,3-Trichlorobenzene	77613	ND		.50
524.2	1,2,4-Trimethylbenzene	77222	ND		.50
524.2	1,3,5-Trimethylbenzene	77226	ND		.50
531.2	Aldicarb (TEMIK)	39053	ND		3.00
531.2	Aldicarb Sulfone	A-020	ND		4.00
531.2	Aldicarb Sulfoxide	A-019	ND		3.00
531.2	Carbaryl (Sevin)	77700	ND		5.00
531.2	3-Hydroxycarbofuran	A-021	ND		3.00
531.2	Methomyl	39051	ND		2.00

AGRICULTURAL CHEMICAL AND MISCELLANEOUS ORGANIC ANALYSIS (10/97)

Date of Report: 13/02/14 Sample ID No.3A29032-01

Laboratory Signature Lab
Name: MOORE TWINING ASSOCIATES, INC. Director:

Name of Sampler:SM Employed By:

Date/Time Sample Collected:13/01/29/0920 | Date/Time Sample Received @ Lab:13/01/29/1555 | Date Analyses Completed:13/02/04

System Name:LODI, CITY OF | System Number: 3910004

Name or Number of Sample Source:SWTF - TREATED WATER

* User ID: PTA Station Number: 3910004-049 *
* Date/Time of Sample: |13|01|29|0920| Laboratory Code: 5802 *
* YY MM DD TTTT YY MM DD *
* Date Analysis completed: |13|02|04| *
* Submitted by:_____ Phone #:_____ *

Page 1 of 1

TEST METHOD	CHEMICAL ALL CHEMICALS REPORTED ug/L	ENTRY #	ANALYSES RESULTS	MCL ug/L	DLR ug/L
524.2	cis-1,3-Dichloropropene (D-D)	34704	ND	0.5	
524.2	trans-1,3-Dichloropropene	34699	ND	0.5	
531.2	Methiocarb (MESUROL)	38500	ND		
531.2	Propoxur (BAYGON)	38537	ND		

City of Lodi
Public Works Department
1331 South Ham Lane
Lodi, CA 95242
(209) 333-6749

Attn: Andrew Richle
arichle@lodi.gov

Surface Water (grab)
User ID# PTA
System# 3910004
Reports to be in Electronic Deliverable Format (EDT)

WATER

3429037

Sampled by: SM

Date	Time	Location	505	515	524	525	531	548	549	Extra Sample			Container	Preservation
			Analyses Requested											
1-29-13	920	Treated Water (3910004-049)	X										3 VOA	6°C
		Treated Water (3910004-049)		X									250ml AG	6°C
		Treated Water (3910004-049)			X								3 VOA	HCL
		Treated Water (3910004-049)				X							1L AG	6°C
		Treated Water (3910004-049)					X						2 VOA	K-Citrate
		Treated Water (3910004-049)						X					250ml AG	6°C
		Treated Water (3910004-049)							X				250 AP	6°C
		Treated Water (3910004-049)								X			1L AG	6°C

Relinquished by: Brian Bock **Time** 1240 **Date** 1-29-13
Received by: Y. Clayton **Time** 12:40 **Date** 1.29.13
Relinquished by: Y. Clayton **Time** 1555 **Date** 1.29.13
Received by: Liz Ruder **Time** ↓ **Date** ↓

W:\Inspectors\My Documents\COC\SWTPTITLE22.xls

Sample Integrity Page 2 of 3 WO# 3A29032 Date Received: 1/29/13

Section 1-Sampled Same Day

Sample Transport: Walk In ~~MTA Courier~~ Transported In: ~~Ice Chest~~ Box Hand

Has Chilling Begun? Yes No

Section 2-Sampled Previously

Sample Transport: Walk-in UPS GSO Fed Ex MTA Courier Other:_____

No. Coolers/Ice Chests:_____ Temperature(s):_____

Was Temperature In Range: Y or N Received On Ice: Wet Blue

Describe type of packing materials: Bubble Wrap Foam Packing Peanuts Paper Other:_____

Were ice chest custody seals present? Y or N Intact? Y or N

Section 3-COC Info.

	Completed			Completed	
	Yes	No		Yes	No
Was COC Received	X		Analysis Requested	X	
Date Sampled	X		Any hold times less than 72hr		X
Time Sampled	X		Client Name	X	
Sample ID	X		Address	X	
Special Storage/Handling Ins.		X	Telephone #	X	

Section 4-Bottles/Analysis

	Yes	No	N/A	Comment
Did all bottles arrive unbroken and intact?	X			
Were bottle custody seals present?		X		
Were bottle custody seals intact?		X		
Did all bottle labels agree with COC?	X			
Were correct containers used for the tests requested?	X			
Was sufficient amount of sample sent for tests indicated?	X			
Were bubbles present in VOA Vials? (Volatiles Methods Only)			X	
Were Ascorbic Acid Bottles Received with VOAs?			X	

Section 5-Comment/Discrepancies

Sample(s) Split/Preserve: Yes or No Container:_____ Preservation:_____ Initials:_____

Filtered: Yes No Container:_____ Preservation:_____ Initials: _____

Was Client Service Supervisor notified of discrepancies: Yes or No N/A Notified by:_____

Explanations/Comments:

Labeled by:_____ Checked by:_____

Moore Twining Associates, Inc.

Sample Integrity Page 3 of 3 WO# 3A29032 MTA Bottles (Yes) or No

Plastic 125mL (A) Plastic 250mL (B) Plastic 1L (C) Amber Glass (AG)												
Sample(s) Received	1											
Bacti 100mL Thiosulfate												
None Preserved Plastic												
HNO3 Plastic												
H2SO4 Plastic												
NaOH Plastic												
300mL DO Bottle												
Other 250 AP thio	1B											
Client Own												
1L Plastic NaOH/ZnAc												
250mL (AG) None												
250mL (AG) H2SO4												
250mL (AG) Thio 547, 548	2B											
250mL (AG) Other												
500mL Clear Glass None												
1L (AG) None												
1L (AG) HCl												
1L (AG) Thio 525, 515	2C											
40mL (AG VOA) Thio + K Citrate 531.2	3											
40mL VOA Vial - HCl	3											
40mL VOA Vial - None												
40mL VOA Vial - H3PO4												
40mL VOA Vial (AG) - thio (THM)	3											
40mL VOA Vial - Na2SO3 (thio)												
Soil Jar Clear Glass 125mL 250mL 500mL												
THM 40mL VOA None												
Plastic Bag												
Soil Tube												
Tedlar Bags												
Asbestos 1L Plastic												
Gross Alpha/Beta 1L HNO3 each												
Radiological 226/228 1L HNO3 each												
Radon												
Low Level Hg/Metals Double Bag												

H-3

Storm Drain Detectives Complete Data Set

Table 1. Site #1: Cliff Avenue

Date	Constituents				
	pH	D.O. (mg/L)	Turbidity (NTU)	TDS (uS)	Nitrate (mg/L)
8-Jun-07	8	8.2	6.1	90	0
13-Jul-07	7.8	8.48	2.1	35	0
24-Aug-07	7.8	9.08	2.2	40	0
14-Sep-07	7.5	7.32	2.1	40	0
28-Sep-07	7.1	7.5	2.3	30	0
12-Oct-07	7.3		2.3	40	0
26-Oct-07	7		2.2	30	0
9-Nov-07	8.5	10.7	4.2	50	0
30-Nov-07	7.2	11.08	2.2	30	0
14-Dec-07	7.7	11.16	2.6	30	0
11-Jan-08	8.1	11.06	5.2	30	0
25-Jan-08	8.1	11.35	12.5	30	0
8-Feb-08	7.4	11.45	4	40	0
22-Feb-08	7.4	11.05	2.4	40	0
14-Mar-08	7.4	10.6	3.7	50	0
28-Mar-08	7.2	10.42	2.5	70	0
11-Apr-08	7.6	10.8	2.3	50	0
25-Apr-08	7.2	10.4	2.6	60	0
9-May-08	7.6	9.73	2.8	40	0
23-May-08	7.4	9.24	2.4	30	0
13-Jun-08	7.8	8.33	3.2	60	0
27-Jun-08	7.8	9.01	3.6	50	0
8-Aug-08	8.5	8.6		30	0
22-Aug-08	7.7	8.87	4.3	50	0
12-Sep-08	7.3	8.45		50	0
26-Sep-08	8	8.6	2.4	50	0
10-Oct-08	8	9.85	2.47	40	0
24-Oct-08	7.6	9.8	1.7	50	0
7-Nov-08	6.2	12.1	3	60	
21-Nov-08	8.2	10.18	2.6	50	0
5-Dec-08	7.7	9.61	3.9	50	0
19-Dec-08	7.8	9.85	4.7	50	0
9-Jan-09	8	10.9	4.9	50	0
23-Jan-09	7.5	10.89	2.1	50	0
13-Feb-09	8	10.56	2.5	50	0
27-Feb-09	7.6	10.3	3.1	50	0
13-Mar-09	7.6	10.35	3.6	50	0
10-Apr-09	8	9.74	1.5	40	0
24-Apr-09	7.2	11.97	2.36	30	0
8-May-09	7.7	9.16	1.7	40	0
22-May-09	7.4	8.92	1.9	40	0
12-Jun-09	6.4	8.8		55	
26-Jun-09	6.9	8	8.2	40	
24-Jul-09	8	9.83	1.4	40	
28-Aug-09	7.8	10.2	2.8	50	0
11-Sep-09	7	10.7	0.84	30	0
25-Sep-09	7.9	9.76	0.8	0	0
9-Oct-09	7.9	10.62	0.5	0	0
23-Oct-09	7.9	9.8	0.8	0	0
6-Nov-09	7	9.3	4.7	20	0
20-Nov-09	7	9.2	4.6	20	0

4-Dec-09	7.3	9.6	3.9	42	0
15-Jan-10		11.52			
29-Jan-10	8.2	11.58			0
12-Feb-10	7.7	11.31	48	20	0
26-Feb-10	7.6	11.51	50	20	0
12-Mar-10	6.6	10.85	7.22	4	0
26-Mar-10	7.2	10.22	20	40	0
9-Apr-10	7.5	10.4	20	40	0
23-Apr-10	8	9.5	2.5	40	0
7-May-10	7	9.1	3.1	40	0
21-May-10	7.6	9.4	3	40	0
18-Jun-10	6.4	8.3	6.6	30	
16-Jul-10	7	8.1	7.9	40	
10-Sep-10	7.5	8.67	2.7	50	
24-Sep-10	7	10.31		40	0
8-Oct-10	7.5	8.98	4.9	50	0
22-Nov-10	6.7	8.92	7.5	50	0
5-Nov-10	6.7	9.06	3.9		0
19-Nov-10	8.5	9.48	2.9	40	0
3-Dec-10	7	10.36	8.8	50	0
17-Dec-10	6.4	9.32	6.3	50	0.98
14-Jan-11	7.4	9.7	2.87	50	0
28-Jan-11	8	10.52	1.8	50	0
10-Feb-11	7.4	9.5	2.1	50	0.2
25-Feb-11	7.7	10.9	2.31	50	0
11-Mar-11	7.1	10.98	2.53	40	0.04
25-Mar-11	7.8	9.97	4.8	40	0
8-Apr-11	8.1	11.36	3.6	50	0.02
22-Apr-11	7.4	11.5	5.5	70	0
13-May-11	5.5	11.44	1.9	60	0
17-Jun-11	8.4	7.65	2.28	40	
10-Aug-11	8.2	8.75	2.53	30	0
23-Aug-11	7.4	10.55	4.1	30	0
14-Sep-11	8.6	9	3.91	90	0
27-Sep-11	7.6	10.67	1.53	30	0
12-Oct-11	7.5	8.68	1.69	50	0.2
25-Oct-11	8.2	10.16	2.03	30	0
2-Nov-11	7.6	8.86	2.98	40	0
29-Nov-11	7.7	10.86	1.58	30	0
7-Dec-11	6.9	11.84	1.98	50	0
20-Dec-11	7.7	12.56	1.27	40	0
11-Jan-12	8	12.97	1.94	50	0
24-Jan-12	7.5	10.95	1.29	30	0
8-Feb-12	8.5	11.15	1.06	40	0
21-Feb-12	9.6	12.19	1.48	40	0
14-Mar-12	6.1	10.92	1.2	40	0
27-Mar-12	7.5	10.78	1.71	30	0
11-Apr-12	8.2	10.4	4.34	40	0
24-Apr-12	7	10.3	2.04	30	0
12-Jun-12	7.6	8.3	2.11	50	0
18-Jul-12	7.6	9.1	0.91	50	0.01
21-Aug-12	8	8.38	2.15	40	0
25-Sep-12	7.9	9.88	1.98	50	0
10-Oct-12	7.7	9.3	1.9	50	0
23-Oct-12	8.4	9.47	1.29	40	0

14-Nov-12	7.8	10.14	0.17	50	0
27-Nov-12	9.3	9.73	1.17	40	0
5-Dec-12	7.7	8.72	2.61	50	0
18-Dec-12	8.1	9.39	3.82	40	0
9-Jan-13	7.6	10.27	1.89	50	0
22-Jan-13	8.1	10.75	2.31	40	0
13-Feb-13	8.6	10.35	1.6	40	2
26-Feb-13	8	10.27	1.38	30	0
13-Mar-13	7.1	9.72	0.54	40	0.9
26-Mar-13	7.8	9.95	1.09	40	0
10-Apr-13	7.7	9.6	0.86	40	0
23-Apr-13	7.8	8.63	1.29	40	0
8-May-13	8	9.65	0.04	50	0
19-Jun-13	7.7	4.85	1.8	50	0
25-Jul-13	7.7	4.85	1.8	50	0
14-Aug-13	7.4	8.7	1.39	50	0
27-Aug-13	7.6	8.96	1.96	30	0
11-Sep-13	9	8.95	0.86	50	0
24-Sep-13	8.4	8.38	1.49	40	0
9-Oct-13	8.2	9.67	0.04	40	0
22-Oct-13	7.9	9.25	1.01	40	0
13-Nov-13	7.6	9.83	0.93	50	0
26-Nov-13	7.8	11.1	1.15	50	0
11-Dec-13	7.7	9.56	1.24	50	0
17-Dec-13	7.7	11.27	2.75	40	0
8-Jan-14	8.3	9.69	1.26	50	0
21-Jan-14	7.6	10.94	2.13	50	0
12-Feb-14	8.5	8	2.22	50	0
25-Feb-14	8.6	9	0.97	50	0
12-Mar-14	7.8	10.8	1.21	50	0
25-Mar-14	7.9	9.02	1.96	40	0
9-Apr-14	8.2	8	1.3	40	0
22-Apr-14	7.9	9	1.98	30	0
21-May-14	7.7	8.63	1.07	50	0
18-Jun-14	7.9	8.58	1.22	50	0
13-Aug-14	8.4	9	2.77	50	0
10-Sep-14	8	9.42	1.49	50	0
24-Sep-14	8	8.12	1.82	60	0
15-Oct-14	7.8	9.6	2.32	60	0
5-Nov-14	7.6	9.98	2.17	60	0.01
19-Nov-14	7.6	9.5	1.1	60	0
3-Dec-14	8.3	9.59	2.95	60	0
17-Dec-14	7.8	12.9	0.03	70	0
14-Jan-15	7.3	10.5	3.3	75	0
28-Jan-15	8.1	11.04	1.24	60	0.2
11-Feb-15	7.8	10.76	15.22	60	0
25-Feb-15	7.9	11.92	2.34	60	0
11-Mar-15	7.7	10	1.31	60	0
25-Mar-15	8.1	10.92	1.89	60	0
8-Apr-15	8	10.5	2.88	60	9.5
25-Apr-15	8.1	10.92	1.89	60	0
Min	**5.50**	**4.85**	**0.03**	**0.00**	**0.00**
Max	**9.60**	**12.97**	**50.00**	**90.00**	**0.95**
Mean	**7.73**	**9.85**	**3.71**	**44.73**	**0.14**

Table 2. Site #2: Casa del Lodi

Date	Constituents				
	pH	D.O. (mg/L)	Turbidity (NTU)	TDS (uS)	Nitrate (mg/L)
24-Aug-07	7.2	9	2.42	40	0
14-Sep-07	7.7	8.02	1.5	30	0
28-Sep-07	7.1	7.6	3.2	40	0
12-Oct-07	7.1		4.1	40	0
26-Oct-07	7.3		2.1	30	
9-Nov-07	8.4	10.48	10.4	40	0
30-Nov-07	7.3	10.6	2.9	30	0
14-Dec-07	7.5	10.94	1.7	30	0
11-Jan-08	7.8	11.05	6.2	30	0
25-Jan-08	7.8	11.3	12.2	40	0
8-Feb-08	7.7	11.6	3.7	40	0
22-Feb-08	7.9	10.85	2.8	40	0
14-Mar-08	7.2	10.7	2.4	50	0
28-Mar-08	7.1	10.62	3.6	40	0
11-Apr-08	7.4	9.95	2.9	50	0
25-Apr-08	7.2	10.12	2.7	60	0
9-May-08	7.4	9.15	2.6	30	0
23-May-08	7.2	8.96	2.7	40	0
22-Aug-08	7.2	8.18	4.6	50	0
12-Sep-08	7.3	8.3		50	0
26-Sep-08	7.8	8.25	3.8	40	0
10-Oct-08	7.7	8.45	2.53	30	0
24-Oct-08	7.5	8.45	2.4	50	0
7-Nov-08	5.9	11.89	10.8	50	
21-Nov-08	8.1	10.1	2.1	50	0
5-Dec-08	7.5	9.2	4.9	50	0
19-Dec-08	7.8	9.98	7.7	50	0
9-Jan-09	7.5	10.87	4.2	50	0
23-Jan-09	7.3	10.47	2.5	50	0
13-Feb-09	8	10.28	4.8	50	0
27-Feb-09	7.7	10.03	3.5	50	0
13-Mar-09	7.8	10.11	4.2	50	0
10-Apr-09	7.4	9.27	4.1	40	0
24-Apr-09	6.8	10.1	2.38	30	0
8-May-09	7.6	8.46	2.2	40	0
22-May-09	7.5	8.62	2.1	40	0
14-Aug-09	7.8	9.7	70	44	0
25-Sep-09	7.9	7	0.8	0	0
9-Oct-09	7.9	9.94	0.9	0	0
23-Oct-09	7.9	9.8	0.8	0	0
6-Nov-09	6.9	9.3	4.7	20	0
20-Nov-09	7	9.3	4.6	20	0
4-Dec-09	7.4	9.3	3.5	40	0
15-Jan-10		11.55			
29-Jan-10	7.8	11.59			0
10-Feb-10	6.9	9.35	1.48	50	0.2
12-Feb-10	7.8	10.89	49	20	0
26-Feb-10	7.7	11.23	50	20	0
26-Mar-10	7.3	10.23	20	40	0
9-Apr-10	7.4	10.41	20	40	0
7-May-10	7	9.2	2.1	40	0

10-Sep-10	7.4	8.46		50	0
24-Sep-10	6.9	6.77	40	20	0
8-Oct-10	7.6	8.53	38.2	50	0
22-Oct-10	7.8	9.06	3.2	50	0
5-Nov-10	6.7	8.82	3		0
19-Nov-10	8.4	9.4	2.9	40	0
3-Dec-10	5.5	10.05	4.6	50	0
17-Dec-10	7.8	8.56	2.5	40	0
14-Jan-11	7.6	9.82	2.78	40	0
28-Jan-11	8.7	11.77	4.7	40	0
25-Feb-11	8.8	11.88	7.6	40	0
11-Mar-11	7.4	10.13	2.56	40	0.08
25-Mar-11	8.9	11.16	6.68	30	0
8-Apr-11	7.9	11.2	3.53	50	0.02
22-Apr-11	7.1	11.6	3.21	50	0
13-May-11	8.2	11.47	40		0
10-Aug-11	8.2	8.95	1.44	30	0
23-Aug-11	7.2	10.2	1.68	30	0
14-Sep-11	8.4	9.3	4.01	50	0
27-Sep-11	7.4	10.15	2.5	40	0
12-Oct-11	6.9	8.4	1.52	40	0
25-Oct-11	8.1	10.22	2	30	0
2-Nov-11	7.8	8.71	2.44	40	0
29-Nov-11	8.1	11.35	2.1	30	0
7-Dec-11	6.9	11.16	1.83	40	0
20-Dec-11	7.5	12.51	1.3	40	0
11-Jan-12	8.1	13.2	2.55	40	0
24-Jan-12	7.8	11	1.29	30	0
8-Feb-12	8.1	10.42	1.43	40	0
21-Feb-12	9.3	11.98	1.33	40	0
14-Mar-12	6.2	10.09	2.57	40	0
27-Mar-12	7.2	10.75	1.7	30	0
11-Apr-12	8.9	9.95	9.31	40	0
12-Jun-12	7.8	8.13	2.17	40	0
18-Jul-12	7.6	8.8	1.62	50	0
25-Sep-12	8.4	9.75	2.1	50	0
10-Oct-12	7.6	9.61	1.19	50	0
23-Oct-12	8.3	10.13	1.44	50	0
14-Nov-12	7.3	10.28	1.22	60	0
27-Nov-12	7.8	9.61	2.08	40	0
27-Nov-12	8.3	9.71	3.68	40	0
5-Dec-12	7.4	8	1.68	50	0
9-Jan-13	7.4	10.93	1.99	50	0
22-Jan-13	7.9	10.65	1.98	40	0
13-Feb-13	8.2	10.6	1.6	40	0
13-Mar-13	7.7	9.86	0.54	50	0
26-Mar-13	7.9	9.3	1.1	40	0
10-Apr-13	7.8	7	1.26	40	0
23-Apr-13	7.9	8.65	1.59	40	0
8-May-13	8.2	9.5	1.11	50	0
19-Jun-13	7.7	5.35	1.27	40	0
25-Jul-13	7.7	5.35	1.27	40	0
14-Aug-13	7.4	8.09	1.05	50	0
27-Aug-13	7.9	8.96	2.13	30	0
11-Sep-13	8.8	8.76	1.73	50	0

24-Sep-13	8.5	9.09	1.35	40	0
9-Oct-13	8.5	9.73	2.5	40	0
22-Oct-13	7.8	8	1.55	40	0
13-Nov-13	7.8	10.04	0.9	50	0
26-Nov-13	7.8	10.56	0.94	50	0
11-Dec-13	7.8	10.04	1.12	50	0
17-Dec-13	7.8	9.8	1.44	40	0
8-Jan-14	8.2	9.74	1.66	50	0
21-Jan-14	7.8	10.71	0.79	50	0
12-Feb-14	8.2	7	1.66	50	0
25-Feb-14	8	8.5	0.05	50	0
25-Feb-14	8	9.25	2.02	40	0
12-Mar-14	7.8	10.68	1.56	50	0
9-Apr-14	8.1	8	1.23	50	0
22-Apr-14	8.1	9	2.1	30	0
21-May-14	7.8	8.94	1.07	50	0
18-Jun-14	7.9	8.79	1.72	50	0
13-Aug-14	8.2	7	1.36	50	0
27-Aug-14	8	9.1	1.77	60	0
10-Sep-14	8.2	9.32	1.58	60	0
24-Sep-14	8	9.2	2	50	0
15-Oct-14	7.7	9.51	2.28	60	0
5-Nov-14	7.6	9.82	6.98	60	0
19-Nov-14	8.1	9.45	1.43	60	0
3-Dec-14	8.5	9.37	9.27	60	0
17-Dec-14	7.6	9.56	3.57	60	0
14-Jan-15	7.4	10.3	1.47	60	0
28-Jan-15	8	11.3	1.12	60	0
11-Feb-15	8.3	11.02	7	60	0
25-Feb-15	8	11.5	1.9	50	0
11-Mar-15	8.8	13.8	1	60	0
25-Mar-15	8	10.94	1.89	50	0
8-Apr-15	7.7	10.5	2.93	60	10.5
25-Apr-15	8	10.94	1.89	50	0
Min	**5.50**	**5.35**	**0.05**	**0.00**	**0.00**
Max	**9.30**	**13.80**	**70.00**	**60.00**	**1.05**
Mean	**7.79**	**9.72**	**5.27**	**42.80**	**0.10**

Table 3. Site #5: 1050 N Lincoln Avenue

	Constituents				
Date	**pH**	**D.O. (mg/L)**	**Turbidity (NTU)**	**TDS (uS)**	**Nitrate (mg/L)**
9-Nov-07	6.9	8.32	3.2	40	0
14-Dec-07	8.1	10.3	10	70	0
11-Jan-08	7.7	8.95	7.9	70	0
8-Feb-08	8.5	9.6	13.1	40	0
22-Feb-08	7.7	8.61	5.7	40	0
14-Mar-08	7.4		9.6	40	0
28-Mar-08	7.5	9.57	8.4	50	0
11-Apr-08	7.8	7.62	3.4	30	0
25-Apr-08	7	9.47	4.5	50	0
9-May-08	7.1	9.4	6	50	0
22-Aug-08	7.6	7	9.6	50	
12-Sep-08	6.8	7.25	0	20	

24-Oct-08	7.9	10.3	11.5	50	
7-Nov-08	5.6	9.4	5.1	50	
21-Nov-08	7.5	10.6	10.1	50	
5-Dec-08	7.5	11	2.4	50	
19-Dec-08	8.5	12.6	11.3		
9-Jan-09	8.1	7.2	7.4	40	
13-Feb-09	6.4	11.1	8.3	50	
27-Feb-09	7.6	11.35	59.4	50	
13-Mar-09	6.7	10.8	9.9	50	
10-Apr-09	6.3	11.3	13.1	40	
24-Apr-09	7.7	10.8	2.7	50	
8-May-09	7.1	10.13	3.6	50	0
22-May-09	6.5	10.36	3.4	40	0
Min	**5.60**	**7.00**	**0.00**	**20.00**	**0.00**
Max	**8.50**	**12.60**	**59.40**	**70.00**	**0.00**
Mean	**7.34**	**9.71**	**9.18**	**46.67**	**0.00**

Table 4. Site #6A: Pigs Lake, Lodi Lake Park

	Constituents				
Date	**pH**	**D.O. (mg/L)**	**Turbidity (NTU)**	**TDS (uS)**	**Nitrate (mg/L)**
14-Mar-08	7.6	9.6	3.1	50	

Table 5. Site #6B: Pigs Lake, Lodi Lake Park

	Constituents				
Date	**pH**	**D.O. (mg/L)**	**Turbidity (NTU)**	**TDS (uS)**	**Nitrate (mg/L)**
14-Mar-08	7.8	9.39	3.2	50	

Table 6. Site #7: RV Area, Lodi Lake Park

	Constituents				
Date	**pH**	**D.O. (mg/L)**	**Turbidity (NTU)**	**TDS (uS)**	**Nitrate (mg/L)**
14-Sep-07	7.8		2.7	40	0
28-Sep-07	7.5	9.15	4.5	50	0
26-Oct-07	7.7	7.8	4.7	90	
9-Nov-07	7.8	8.5	3.9	50	
14-Dec-07	9.4	11.52	3	40	0
11-Jan-08	7.6	8.5	10.1	70	0
25-Jan-08	8.5	10.96	6.8	0	0.25
8-Feb-08	8	9.27	16.1	40	0
8-Feb-08	7.7	11.24	16	30	0
22-Feb-08	8.5	10.68	3.1	40	0.04
28-Mar-08	7.5	9.58	13.65	40	0
25-Apr-08	7.1	7.68	3.2	40	0
13-Jun-08	7.8	7.05	2.8	60	0
27-Jun-08	7.6	8.65	3.4	50	0
8-Aug-08	7.5	6.8	2.29	60	
22-Aug-08	8.3	8	2.47	30	0
12-Sep-08	7.5	7.11	1.63		
24-Oct-08	7.1	11.16	2.58	40	0
7-Nov-08	7.6	9.6	3.67	60	0

21-Nov-08	7.8	10.17	2.11	30	0
5-Dec-08	8.5	10.73	3.27	70	0
19-Dec-08	7.8	11.22	3.09	40	0
9-Jan-09	7.9	11.59	2.35	70	0
23-Jan-09	8.2	10.45		50	0
13-Feb-09	9	10.87	8.77	40	0
27-Feb-09	8.2		3.3	50	0.1
13-Mar-09	8.8	11.35	2.18	40	0
10-Apr-09	7.5	9.55	2.45	40	0
8-May-09	7.2	10	5.5	40	0
22-May-09	8.1	8.9	3.55	30	0
12-Jun-09	7	8.8	4.4	55	
26-Jun-09	6.3	7.4	4.2	50	
10-Jul-09	7.6	8.7		50	
24-Jul-09	7.8	9.54	1.5	50	
14-Aug-09	6.4	8	1.58	40	0
11-Sep-09	7	9.7	3.9	30	0
25-Sep-09	7.8	8.5	3.2	40	0
9-Oct-09		8.9	7.1	40	0
23-Oct-09	7.8	9.11		40	0
6-Nov-09		9.21	7.7	30	0
20-Nov-09	7.8	9.35		40	0
4-Dec-09	7.7	10.66	2.4	30	0
18-Dec-09	8	10.24	2.3	40	0
15-Jan-10	8	11.5	1.64	30	0
29-Jan-10	7.9	9.92	1.3	40	0
26-Feb-10	7.9	9.4	14.8	30	0
12-Mar-10	8.2	10.4		30	0
26-Mar-10	7.5	10.4	1.2	40	
9-Apr-10	7.6	10.44	0.5	40	0
7-May-10	7.1	10.84	2.9		0
10-Sep-10	7.2	8.93	4.1	40	
24-Sep-10	6.9	9.6		50	0
8-Oct-10	7.6	8.4	4.6	40	
5-Nov-10	7.8	9.3	2	40	0.04
19-Nov-10	7.4	9	3.1	40	
3-Dec-10	6		6	80	
17-Dec-10	7.4	9.6	6.3	50	0.02
14-Jan-11	8.5		2.46	50	0
28-Jan-11	7	11	1.85	40	0
10-Feb-11	7.3		1.4	40	0
25-Feb-11	8.1	11.4	3.97	50	0
13-May-11	7.8		2.02	40	0
10-Aug-11	7.4	9.2	2.04	40	0.13
23-Aug-11	6.4	8.96	1.67	40	0
14-Sep-11	7	7.43	1.02	50	0.02
27-Sep-11	7.5	10.42	1.38	40	0
12-Oct-11	6.5	8.4	2.68	30	0.1
25-Oct-11		11.26	1.55	30	0
2-Nov-11	7.1	8.65	6.94	40	0.76
29-Nov-11	7.9	10.54	2.11	30	0
7-Dec-11	7.4	10.04	1.69	40	0
20-Dec-11	7.5	13.4	1.27	40	0
11-Jan-12	7	12.23	1.09	20	0
24-Jan-12	9.3	11.25	1.51	30	0

24-Jan-12	9.3	12.35	1.1	30	0
8-Feb-12	7.5	8.81	7.89	20	0
14-Mar-12	8	9	1.73	50	0
27-Mar-12	7.1	10.74	2.3	30	0
11-Apr-12	7.4	8.82	2.67	40	0
12-Jun-12	7.3	8.67	1.53	40	0
18-Jul-12	7.3	8.5	3.13	50	0.01
21-Aug-12	7.5	7.5	2.39	50	0.02
25-Sep-12	7.4	9.42	1.13	50	0.02
10-Oct-12	7.5	9.13	1.47	50	0
23-Oct-12	7.4	8.64	3	50	0.02
14-Nov-12	7.4	8.6	1.59	60	0
27-Nov-12	7.8	8.9	2.12	50	0
5-Dec-12	7.6	8.42	1.6	50	0
18-Dec-12	7.2	9.3	1.68	50	0.05
9-Jan-13	7.6		1.55	50	0.025
22-Jan-13	7.7	10.94	0.8	50	0
13-Feb-13	7.7	11.2	10.3	40	0.04
26-Feb-13	7.7	10	1.27	40	0
13-Mar-13	7.8	9.72	0.84	40	0
26-Mar-13	7.8	9.34	2.16	50	0
10-Apr-13	7.4	11.6	0.71	40	0
23-Apr-13	7.6	9.05	0.09	70	0
8-May-13	7.4		12.64	40	0
19-Jun-13	7.8	9.81	2.1	50	0
25-Jul-13	7.4	8.13	1.61	50	0
14-Aug-13	8	8.5	7.41	40	0
27-Aug-13	7.7	9.78	1.4	50	0
11-Sep-13	7.8	8.6	1.04	50	0
24-Sep-13	7.4	8.77	1.69	50	0
9-Oct-13	8.1	9.6	1.89	40	0
22-Oct-13	7.5	9.49	1.01	50	0
13-Nov-13	8.2	10.66	1.77	40	0
26-Nov-13	8.4	10.23	1.1	50	0
11-Dec-13	8.3	10.75	1.47	60	0
17-Dec-13	8	7.9	1.63	50	0
8-Jan-14	7.7	9.47	1.28	50	0
21-Jan-14	8	9	0.58	50	0
12-Feb-14	7.6	8.69	2.11	50	0
25-Feb-14	7.6	8.1	7.42	50	0
12-Mar-14	7.5	9.3	2.02	50	0
25-Mar-14	7.6	9	1.28	50	0
9-Apr-14	7.4	9.7	3.38	50	0
22-Apr-14	7.9	9.3	1.41	50	0
21-May-14	8.3	9	2.32	50	0
18-Jun-14	8	8.51	5.79	50	0
13-Aug-14	7.9	8.36	1.82	50	0
27-Aug-14	8.4	10.45	2.12	50	0.04
10-Sep-14	8	9.59	1.41	50	0
24-Sep-14	7.8	9.55	2.06	60	0
15-Oct-14	8	9.35	1.54	50	0
5-Nov-14	7.6	10.5	2.13	60	0
19-Nov-14	8.6	10.17	1.81	60	0
3-Dec-14	7.5	9.1	3.56	60	0
17-Dec-14	8.2	9.65	2.32	60	0

15-Jan-15	8.1	10.31	1.37	60	0
28-Jan-15	8.7	11.46	4.89	60	0
11-Feb-15	7.7	11.4	2.55	60	0.5
25-Feb-15	7.2	10.75	2.05	60	0
11-Mar-15	7.4	10.02	1.66	50	0
25-Mar-15	7.8	9.73	1.87	60	0
8-Apr-15	7.9	9.72	1.66	60	0
25-Apr-15	7.8	9.73	1.87	60	0
Min	**6.00**	**7.40**	**0.09**	**20.00**	**0.00**
Max	**9.30**	**13.40**	**14.80**	**80.00**	**0.76**
Mean	**7.64**	**9.61**	**2.75**	**45.79**	**0.02**

Table 7. Site #7A: Laurel Avenue

	Constituents				
Date	**pH**	**D.O. (mg/L)**	**Turbidity (NTU)**	**TDS (uS)**	**Nitrate (mg/L)**
14-Sep-07	7.6		2.7	50	0
28-Sep-07	7.8	8.57	4.8	50	0
8-Aug-08	7.4	6.72	5.32	60	
12-Sep-08	7.4	6.8	2.73		
26-Sep-08	8.8	10.1	2.94	40	0
24-Oct-08	7.8	11.2	5.17	40	0
10-Apr-09	7.5	9.6	1.7	40	0
24-Apr-09	7.5	7.92	2.2	40	0
8-May-09	7.6	10.3	7.4	40	0
14-Aug-09	7.4	8	5	50	0
11-Sep-09	6.5	10.5	1.5	40	0
6-Nov-09	7.4	8.83	3.4	30	0
8-Apr-11	7.4	11.5	4.05	50	0

Table 8. Site #8: Lodi Lake near SWTF

	Constituents				
Date	**pH**	**D.O. (mg/L)**	**Turbidity (NTU)**	**TDS (uS)**	**Nitrate (mg/L)**
28-Mar-08	8.2	11.4	3.1	50	na
14-Sep-07	7.5	8.02	1.33	70	0
28-Sep-07	8	6.55	2.36	40	0
11-Jan-08	7.8	12.4	13.4	60	0
22-Feb-08	7.8	9.28	14	80	0.06
22-Aug-08	8.6	8.22	4	40	0
21-Nov-08	7.8		2.08	200	0.33
19-Dec-08	7.8	8.73	15.2	200	0
9-Jan-09	7.8	9.37	2.49	460	0.2
23-Jan-09	7.9	10.5		40	0.1
13-Feb-09	8.6	10.26	12.2	100	0
27-Feb-09	8.3		4.35	100	0.06
24-Apr-09	7.6	7.79	2.8	50	0
22-May-09	8.1	7.92	2.69	30	0
20-Nov-09	7.7	8.9		110	0.09
4-Dec-09	8.7	6.2	4.3	240	0.88
18-Dec-09	7.8	8.28	1.9	240	0.09
15-Jan-10	7.35	9.96	9	40	0
29-Jan-10	7.8	5.8		200	0.3

26-Feb-10	7.4	8.47	18.6	100	0.12
12-Mar-10	8.6	10.1		30	0
26-Mar-10	7.5	9.53	1.48	40	0
9-Apr-10	7.9	9.8	1.89	40	
23-Apr-10	7.7	8.6	8.7	40	0
7-May-10	7.4	10	2.05	40	0
24-Sep-10	8.2	9.9		50	0
22-Oct-10	7.2	8.62	2.3	60	0
5-Nov-10	7.8	8.4	3.2	60	0
19-Nov-10	7.1	8.3	2.3	90	
3-Dec-10	8.4	9.57	5.1	50	
17-Dec-10	7.3	9.55	3.12	80	0
14-Jan-11	8.6	10.47	3.42	50	0
28-Jan-11	7	11.1	5.24	70	0
10-Feb-11	7.3	7	1.77	270	0
25-Feb-11	7.8	11.6	11.7	70	1
11-Mar-11	7.8	11.3	2.52	50	0
25-Mar-11	8	10.8	9	5	0
8-Apr-11	8	11.3	5.48	50	0
22-Apr-11	7.6	10.4	4.71	50	0.02
13-May-11	7.6	10.6	2.15	40	0
14-Sep-11	7.1	7.68	2.74	50	0.01
12-Oct-11	6.4	8.17	2.64	40	0.1
25-Oct-11	8.3	11.29	1.78	30	0
2-Nov-11	7.4	13	2.72	60	0
29-Nov-11	7.9	10.68	2.21	30	0
7-Dec-11	6.3	10.4	2.53	50	0
11-Jan-12	7.6	9	2.33	40	0
24-Jan-12	8.9		1.52	30	0
8-Feb-12	7.2	9.7	5	70	1
13-Mar-12	7.1	9.68	2.98	50	0.025
27-Mar-12	7.2	11.02	2.19	30	0
11-Apr-12	7.5	8.85	4.4	1000	1
12-Jun-12	7.5	9.75	1.84	40	0
18-Jul-12	7.4	9.65	7.24	60	0
10-Oct-12	7.8	9.3	2.31	120	0
23-Oct-12	7.9	8.4	4.2	50	0
14-Nov-12	7.8	9.63	2.44	50	0
27-Nov-12	7.9	8.68	2.45	40	0
5-Dec-12	7.7	7.55	1.47	50	0
18-Dec-12	7.7	10.21	2.98	50	0
9-Jan-13	7.7	10	3.7	40	0
22-Jan-13	7.9	11.05	3.1	50	0
26-Feb-13	8.2	7.6	3.45	50	0
13-Mar-13	7.9	9.64	3.38		0
26-Mar-13	7.6	9.80	2.75	50	0
10-Apr-13	7.3	8.31	13.9	50	0.025
23-Apr-13	7.9	9.48	4.03	50	0
8-May-13	7.6	8.50	2.35	50	0
19-Jun-13	7.8	8.80	2.34	70	0
25-Jul-13	7.4	6.40	2.61	50	0
14-Aug-13	6.9	9.41	2.57	50	0
27-Aug-13	8.4	10.20	4.03	50	0
11-Sep-13	7.6	9.00	3.55	50	0
24-Sep-13	7.7	7.89	2.82	50	0

9-Oct-13	8.5	8.97	2.81	60	0
22-Oct-13	7.9	9.09	2.11	50	0
13-Nov-13	7.5	8.73	4.79	50	0
26-Nov-13	7.5	8.70	1.4	40	0
11-Dec-13	7.7	10.6	1.11	70	0
17-Dec-13	8.2	7.3	3.8	60	0
8-Jan-14	8	11.1	3.89	50	0
21-Jan-14	7.8	8.04	2.95	50	0
12-Feb-14	7.8	9.63	4.8	210	0
25-Feb-14	8.6	8.9	4.61	40	0
12-Mar-14	8.3	8.7	6.89	60	0
25-Mar-14	8.1	8.98	3.14	50	0
9-Apr-14	8.1	8	3.1	50	0
22-Apr-14	8.5	9.5	2.09	50	0
21-May-14	8.5	8.47	5.24	60	0
18-Jun-14	9	8	11.1	50	0
13-Aug-14	8.7	9.15	4.35	60	0.2
27-Aug-14	9.1	10.68	5.7	60	0.44
10-Sep-14	9.3	11.41	5.51	60	1.1
24-Sep-14	8.7	9.38	3.2	60	0
15-Oct-14	8.9	11.1	2.86	70	0
5-Nov-14	7.5	9.81	2.33	60	0
19-Nov-14	8	9.97	3.85	50	0
3-Dec-14	7.3	9.62	5.2	70	0
17-Dec-14	8.1	10.37	2.84	40	0
14-Jan-15	6.9	10.1	4.9	60	0
28-Jan-15	8.3	11.1	2.36	60	0
11-Feb-15	7.1	6.12	23.8	190	0
11-Feb-15	7.1	9.56	18.1	182	0
25-Feb-15	8	8.6	3.23	400	0
11-Mar-15	7.6	12.22	1.9	60	0
25-Mar-15	8	10.53	2.34	60	0
8-Apr-15	7.4	9.85	5.39	70	0
25-Apr-15	8	10.53	2.34	60	0
Min	**6.30**	**5.80**	**1.11**	**5.00**	**0.00**
Max	**9.30**	**13.00**	**23.80**	**1000.00**	**1.10**
Mean	**7.83**	**9.40**	**4.53**	**83.71**	**0.07**

Table 9. Site #9: Above WID Dam

	Constituents				
Date	**pH**	**D.O. (mg/L)**	**Turbidity (NTU)**	**TDS (uS)**	**Nitrate (mg/L)**
6-Nov-09	7.7	9.4	0.3	30	0
6/8/2007	8.1	8.33	4.9	30	0
13-Jul-07	7.6	8.2	2.4	40	0
21-May-10	7.9	9.3	2.9	40	0
10-Oct-12	7.9	9.5	0.4	30	0
14-Nov-12	7.7	10.49	1.51	50	0
5-Dec-12	7.6	7.7	1.62	50	0
9-Jan-13	7.6		2.77	50	0
13-Mar-13	7.1	9.65	0.91	30	0
26-Mar-13	7.4	10.28	0.72	50	0
Min	**7.10**	**7.70**	**0.30**	**30.00**	**0.00**
Max	**8.10**	**10.49**	**4.90**	**50.00**	**0.00**

Mean	**7.66**	**9.21**	**1.84**	**40.00**	**0.00**

Table 10. Site #9A: Below WID Dam

	Constituents				
Date	**pH**	**D.O. (mg/L)**	**Turbidity (NTU)**	**TDS (uS)**	**Nitrate (mg/L)**
14-Sep-07	7.8	8.6	1.51	50	0
28-Sep-07	7.9	8.12	2.14	50	0
19-Oct-07	8.2	9.72		50	0
26-Oct-07	7.8	9.9	3.2	50	0
9-Nov-07	7.8	10.04	3.23	50	
16-Nov-07	7.7	10.13		50	0
14-Dec-07	8.5	10.3	1.03	40	0
11-Jan-08	7.7	10.33	4.37	40	0
25-Jan-08	7.5	10	13.3	50	
8-Feb-08		11.2	2.9	40	0
22-Feb-08		10.5	2.32	50	0
22-Feb-08		10.65			0
14-Mar-08	7.1	9.64	2.24		0
28-Mar-08	8.1	10.14	3.25	40	0
11-Apr-08	8				0
25-Apr-08	7.6	9.96	1.79	30	0
9-May-08	8.2	9.9	18	40	2
23-May-08	8.1	9.15	1.92	30	0
13-Jun-08	7.9	8.42	2.85	70	
27-Jun-08	7.6	8.95	2.8	70	0
8-Aug-08	8.5	7.82		30	0
22-Aug-08	7.6	6.78	9.1	48	
12-Sep-08	7	6.72	0	20	
26-Sep-08	8.7	9.5	2.24	30	0
10-Oct-08	8.3	10		50	
24-Oct-08	8	9.5	3.4	50	
7-Nov-08	5.6	9.5	10.9	50	
21-Nov-08	7.8	10.5	7.7	50	
5-Dec-08	7.8	10.3	4.3	50	
19-Dec-08	8.5	9.85	40	50	
9-Jan-09	8.1	7.6	7.4	40	
23-Jan-09	7.5	11.25	16.8	40	
13-Feb-09	6	11.8	8.4	50	
27-Feb-09	8	9.79	20.3	60	
13-Mar-09	7.3	9.6	9.6	50	
10-Apr-09	6.3	9.27	5.9	40	
24-Apr-09	7.1	9.43	4	50	
8-May-09	7.2	9.04	3.2	50	0
22-May-09	7.1	11.2	2.7	40	0
12-Jun-09	6.9	8.8	3.4	60	
26-Jun-09	6.4	7.8	3.6	40	
24-Jul-09	8.1	9.27	2.1	40	
14-Aug-09	8	9.2	10	50	0
28-Aug-09	7.8	10.24	2.3	40	0
11-Sep-09	6.9	10.36	1.8	30	0
25-Sep-09	7.8	9	3.5	40	0
9-Oct-09		10.17	24.7	40	0
23-Oct-09	7.6	10.16		40	0
6-Nov-09	7.7	8.3	6.6	40	0

20-Nov-09	8.2	9.8	11.8	40	0
4-Dec-09	8	10.2	1.72	40	
15-Jan-10	8.1	3.37	6.03		
29-Jan-10	8.4	3.3	3	50	
12-Feb-10	6.5	9.67	4.7	50	
26-Feb-10	7.3	8.4	5.8	30	0.09
12-Mar-10	6.9	10.96	7.92	30	0
26-Mar-10	8.2	10.8	2.3	40	
9-Apr-10	6.8	9.2	5.1	40	
23-Apr-10	6.9	9.5	6	40	0
7-May-10	7.8	10.3	2.49	40	0
21-May-10	5.7	10.3	2.1	50	0
16-Jul-10	7.1	9.67		40	0
10-Sep-10	7.1	8.49		50	0
24-Sep-10	7.4	10.18		50	0
8-Oct-10	7.3	9.4	9.5	40	
22-Oct-10	7.9	8.5	4.6	50	
19-Nov-10	7.6	8.6	4.1	40	
3-Dec-10	5		6	40	
17-Dec-10	8.1	10.5	9.4	50	
14-Jan-11	8.5		6.3	40	
10-Feb-11	8.4	10.3	6.04	60	
25-Feb-11	8.5	10	5.76	50	
11-Mar-11	7.8	11.4	7.08	40	0
26-Mar-11	7.8	9.85	7.36	50	0
8-Apr-11	7	8.65	3.59	40	0
22-Apr-11	6.7	8.3	2.64	50	0
13-May-11	8.5	8.8	4.36		0
17-Jun-11	8.1	9.8	2.9	40	
23-Aug-11	7.8	8.5	2.54	40	0
14-Sep-11	7.4	9.58	1.76	50	0
27-Sep-11	7.6	10.95	1.69	30	0
27-Sep-11	7.1	9.32	3.14	40	0
12-Oct-11	8.1	7.42	2.61	40	0
25-Oct-11	7.5	7.63	2.2	30	0
29-Nov-11	7.7	9.1	1.67	40	0
20-Dec-11	7.5	12.34	1.3	40	0
11-Jan-12	7.5	7.34	11.86	40	
24-Jan-12	7	7.56	7.5	40	
21-Feb-12	8.2	12.35	1.15	40	0
11-Apr-12	8.2	9.6	3.3	40	
24-Apr-12	7	9.37	0.89	30	0
9-May-12	7.4	7.5	4.2	50	
9-May-12	7.4	7.5	4.2	50	
12-Jun-12	7.6	8	1.1	40	0.1
18-Jul-12	7.6	8.2	0.92	50	0
25-Sep-12	7	9.14	8.33	50	0
23-Oct-12	7.6	9.03	2.62	60	0
27-Nov-12	7.7	9.47	1.73	50	0
27-Nov-12	7.5	10.15	1.34	50	0
22-Jan-13	7.9	10.8	0.58	50	0
26-Feb-13	7.6	10.39	0.9	40	0
23-Apr-13	7.8	9.2	4.1	40	0
19-Jun-13	7.8	8.6	1.11	40	0
25-Jul-13	7.8	8.6	1.11	40	0

14-Aug-13	8.4	8.23	0.83	40	0
27-Aug-13	7.9	9	2	60	0
11-Sep-13	8.3	8.82	1.55	50	0
24-Sep-13	7.8	9.26	1.8	50	0
9-Oct-13	7.6	10.52	2.19	50	0
22-Oct-13	8.2	7.9	1.6	50	0
13-Nov-13	7.7	10.4	1.18	50	0
26-Nov-13	9	8.42	1.66	50	0
11-Dec-13	8.1	10.66	1.04	50	0.025
17-Dec-13	7.4	11.59	0.97	60	0
8-Jan-14	8	11.44	0.7	50	0
21-Jan-14	8.1	9.87	1.58	40	0
12-Feb-14	8	10.59	2.42	50	0
25-Feb-14	8.3	9.15	1.14	40	0
12-Mar-14	7.2	8.89	1.61	50	0
25-Mar-14	8.1	9.7	1.4	50	0
9-Apr-14	7.8	8.89	2.22	50	0
22-Apr-14	7.6	9.3	1.88	60	0
21-May-14	8.3	8.86	1.3	50	0.02
18-Jun-14	7.9	9	2.9	50	0
13-Aug-14	7.8	8.69	1.32	60	0
27-Aug-14	8.4	9.53	1.93	60	0
10-Sep-14	8	9.27	1.34	50	0
24-Sep-14	7.7	7.68	2.12	60	0
15-Oct-14	7.6	9.66	2.2	60	0
5-Nov-14	8.3	10.55	0.57	50	0
19-Nov-14	7.7	10.3	1.87	60	0
3-Dec-14	7.6	10.11	1.99	50	0
17-Dec-14	7.9	10.2	2.45	60	0
15-Jan-15	7.8	11.64	2.53	60	0
28-Jan-15	7.8	10.7	1.45	60	0
11-Feb-15	8.3	11.2	4.38	60	0.88
25-Feb-15	8.1	12.45	3.44	50	0
11-Mar-15	6.9	10.45	1.57	50	0
25-Mar-15	8	10.25	1.66	50	0
8-Apr-15	7.5	8	2.23	70	0
25-Apr-15	8	10.25	1.66	50	0
Min	**5.00**	**3.30**	**0.57**	**30.00**	**0.00**
Max	**9.00**	**12.45**	**24.70**	**70.00**	**0.88**
Mean	**7.63**	**9.45**	**3.73**	**46.82**	**0.01**

Appendix I

Standard Operating Procedure #011

City of Lodi Water Treatment Plant
Standard Operating Procedure #011

Operation Response to Water Quality Changes

PURPOSE

This procedure should be used to help the operations staff treat changes in water quality at the raw water source. These parameters include but are not limited to Total Organic Carbon (TOC), coliform, turbidity, color or pH.

OBJECTIVE

The objective of this SOP is to determine if additional treatment is required due to the degradation in water quality. Below is a list of standard raw water quality parameters and normal range. If parameter is outside the acceptable action level the operator should follow the procedure below.

STANDARD RAW WATER QUALITY

Constituent	Normal Range	Action Level	Action Level
TOC mg/L	**1.5-2.5**	**See SCV**	**See SCV**
Streaming Current, SCV	**300-500**	**<300**	**>500**
Color, SU	**20-40**	**N/A**	**>40**
pH, SU	**6.5-8.5**	**<6.5**	**>8.5**
Turbidity, NTU	**2.0-4.0**	**N/A**	**>10**

Note:

1. Streaming Current Value (SCV) determined by optimal coagulant dosing resulting from jar testing.
2. Coliform results are made available a minimum 18 hrs. after testing. Historically coliform levels increase during and days after rain/runoff events.

PROCEDURE

	During daily analysis of raw water, if any online or grab sample reaches a value outside the acceptable range (determined by historical data), the operator will need to implement this action plan.
1	Resample and verify on-line instruments with grab samples: Turbidity, Color etc.
2	If abnormal water quality outside the typical range is observed, increase or decrease chemicals ACH or pre-chlorination (Operator determination). During rain/runoff events an increase to Combined Filter Effluent (CFE) chlorine demand can be observed, increase post-chlorination if required (Operator determination). **Call CPO for assistance, if needed**.
3	Monitor water quality after chemical adjustments (Wait for reaction to take place) 15min.
4	Document on laboratory data sheet and operator log all chemical adjustments and plant responses.
5	If treatment is not responding, plant shut down may be required. See short-term plant shutdown SOP. **Call CPO**

REFERENCES

SWTF Operations Plan and O&M Manual, HDR Engineering, Revised March 2015
City of Lodi, Laboratory Data Sheet, March 2013
Chemtrec SCM O&M Manual, Version 120224 JC
City of Lodi- Stage 2 Disinfection/Disinfection Byproduct Plan, August 2012

QUALITY ASSURANCE/ CONTROL

Turbidity

Raw water turbidity along with all other turbidity sample points are to be measured every 15 min. Daily grab sample is analyzed and compared for accuracy.

Total Organic Carbon (TOC)

See **Jar Testing SOP** for determining optimal coagulation dose and SCM value. **SCM and Jar Testing are compared at least biannually.** SCV is to be measured every 15 min using Chemtrec SCM2500. Follow Jar Testing lab sheet and complete all required fields including TOC and UV-254 analysis.

The water treatment plant is required to test monthly for TOC. The samples shall be collected from the raw water and treated water. The samples shall be analyzed for TOC. Additionally, at the time the raw water and CFE sample is collected, the alkalinity shall be determined and reported along with the TOC results. The water treatment plant must operate to achieve the TOC percent removal levels specified in the following table:

Required TOC Removal

Source - Water TOC,	Source - Water Alkalinity, mg/L as CaCO3		
mg/L	0 - 60	> 60 - 120	> 120
> 2.0 - 4.0	35%	25%	15%
> 4.0 - 8.0	45%	35%	25%
> 8.0	50%	40%	30%

Determine compliance by dividing the actual TOC percent removal by the required TOC percent removal for each month, and then average these values for the previous twelve months. If this value is less than 1.00, the system is in non-compliance with TOC percent removal requirements. If for any month the raw or combined filtered water is less than or equal to 2.0 mg/L or the SUVA is less than or equal to 2.0 L/mg-m, the system may assign a monthly value of 1.0 when calculating compliance with TOC removal requirements.
Failure to achieve and maintain the required TOC removal requirements is a treatment technique violation that requires public notice. Contact State Water Resources Control Board (SWRCB), Division of Drinking Water for specific public notice requirements. Additionally, if a WTP cannot achieve the required TOC requirements due to water quality parameters or operational constraints, the water system must apply for an alternate TOC removal requirement.

All other constituents listed in the Standard Raw Water Quality table above are analyzed daily.